Installation, Start-Up and Service Instructions

CONTENTS

Page

SAFETY CONSIDERATIONS 1

INSTALLATION 1-42
Step 1 — Provide Unit Support 1
• ROOF CURB
• ALTERNATE UNIT SUPPORT
Step 2 — Rig and Place Unit 2
• POSITIONING
• ROOF MOUNT
Step 3 — Field Fabricate Ductwork 2
Step 4 — Make Unit Duct Connections 2
Step 5 — Install Flue Hood 19
Step 6 — Trap Condensate Drain 19
Step 7 — Install Gas Piping 19
Step 8 — Controls Options 20
• THERMISTORS
• CONSTANT VOLUME APPLICATIONS
• VARIABLE AIR VOLUME (VAV) APPLICATIONS
Step 9 — Make Electrical Connections 23
• POWER WIRING
• FIELD POWER SUPPLY
• FIELD CONTROL WIRING
Step 10 — Make Outdoor-Air Inlet Adjustments 34
• ECONOMIZER
• ECONOMIZER SETTINGS
Step 11 — Position Power Exhaust/Barometric Relief Hood 39
Step 12 — Install All Accessories 40

START-UP 42-60

SERVICE 60-72

TROUBLESHOOTING 73-81

START-UP CHECKLIST CL-1,CL-2

SAFETY CONSIDERATIONS

Installation and servicing of air-conditioning equipment can be hazardous due to system pressure and electrical components. Only trained and qualified service personnel should install, repair, or service air-conditioning equipment.

Untrained personnel can perform the basic maintenance functions of cleaning coils and filters and replacing filters. All other operations should be performed by trained service personnel. When working on air-conditioning equipment, observe precautions in the literature, tags and labels attached to the unit, and other safety precautions that may apply.

Follow all safety codes. Wear safety glasses and work gloves. Use quenching cloth for unbrazing operations. Have fire extinguishers available for all brazing operations.

⚠ WARNING

Before performing service or maintenance operations on unit, turn off main power switch to unit. Electrical shock could cause personal injury.

⚠ WARNING

1. Improper installation, adjustment, alteration, service, or maintenance can cause property damage, personal injury, or loss of life. Refer to the User's Information Manual provided with this unit for more details.
2. Do not store or use gasoline or other flammable vapors and liquids in the vicinity of this or any other appliance.

What to do if you smell gas:

1. DO NOT try to light any appliance.
2. DO NOT touch any electrical switch, or use any phone in your building.
3. IMMEDIATELY call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions.
4. If you cannot reach your gas supplier, call the fire department.

⚠ WARNING

Disconnect gas piping from unit when pressure testing at pressure greater than 0.5 psig. Pressures greater than 0.5 psig will cause gas valve damage resulting in hazardous condition. If gas valve is subjected to pressure greater than 0.5 psig, it *must* be replaced before use. When pressure testing field-supplied gas piping at pressures of 0.5 psig or less, a unit connected to such piping must be isolated by closing the manual gas valve(s).

INSTALLATION

Step 1 — Provide Unit Support

⚠ CAUTION

1. All panels must be in place when rigging.
2. Unit is not designed for handling by fork truck.

ROOF CURB — Assemble or install accessory roof curb in accordance with instructions shipped with this accessory. See Fig. 1-4. Install insulation, cant strips, roofing, and counter flashing as shown. Ductwork can be installed to roof curb before unit is set in place. Curb should be level. This is necessary to permit unit drain to function properly. Unit leveling tolerance is shown in Fig. 1-3. Refer to Accessory Roof Curb Installation Instructions for additional information as required. When accessory roof curb is used, unit may be installed on class A, B, or C roof covering material.

IMPORTANT: The gasketing of the unit to the roof curb is critical for a watertight seal. Install gasket with the roof curb as shown in Fig. 1-3. Improperly applied gasket can also result in air leaks and poor unit performance.

ALTERNATE UNIT SUPPORT — When the preferred curb or slab mount cannot be used, support unit with sleepers on perimeter, using unit curb support area. If sleepers cannot be used, support long sides of unit (refer to Fig. 5-10) with a minimum number of 4-in. x 4-in. pads spaced as follows: 48EJ,EK,EW,EY024-034 units require 3 pads on each side; 48EJ,EK,EW,EY038-048 units require 4 pads on each side; 48EJ,EK,EW,EY054-068 units require 6 pads on each side. Unit may sag if supported by corners only.

Step 2 — Rig and Place Unit — Inspect unit for transportation damage. See Table 1 for physical data. File any claim with transportation agency.

Do not drop unit; keep upright. Use spreader bars over unit to prevent sling or cable damage. Level by using unit frame as a reference; leveling tolerance is shown in Fig. 1-3. See Fig. 11 for additional information. Unit operating weight is shown in Table 2.

NOTE: On retrofit jobs, ductwork may be attached to old unit instead of roof curb. Be careful not to damage ductwork when removing old unit. Attach existing ductwork to roof curb instead of unit.

Four lifting lugs are provided on the unit base rails as shown in Fig. 5-10. Refer to rigging instructions on unit.

POSITIONING — Maintain clearance, per Fig. 5-10, around and above unit to provide minimum distance from combustible materials, proper airflow, and service access.

Do not install unit in an indoor location. Do not locate unit air inlets near exhaust vents or other sources of contaminated air. For proper unit operation, adequate combustion and ventilation air must be provided in accordance with Section 5.3 (Air for Combustion and Ventilation) of the National Fuel Gas Code, ANSI Z223.1 (American National Standards Institute).

Although unit is weatherproof, guard against water from higher level runoff and overhangs.

Locate mechanical draft system flue assembly at least 4 ft from any opening through which combustion products could enter the building, and at least 4 ft from any adjacent building. When unit is located adjacent to public walkways, flue assembly must be at least 7 ft above grade.

ROOF MOUNT — Check building codes for weight distribution requirements. See Fig. 11. Unit operating weight is shown in Table 2.

Step 3 — Field Fabricate Ductwork — Secure all ducts to building structure. Use flexible duct connectors between unit and ducts as required. Insulate and weatherproof all external ductwork, joints, and roof openings with counter flashing and mastic in accordance with applicable codes.

NOTE: Due to width of the horizontal supply/return ductwork, provisions should be made for servicing of the outdoor air filters (i.e., catwalk over ductwork).

Ducts passing through an unconditioned space must be insulated and covered with a vapor barrier. Outlet grilles must not lie directly below unit discharge. The return duct must have a 90-degree elbow before opening into the building space if the unit is equipped with pwoer exhaust.

To attach ductwork to roof curb, insert duct approximately 10 to 11 in. up into roof curb. Connect ductwork to 14-gage roof curb material with sheet metal screws driven from inside the duct.

⚠ WARNING

For vertical supply and return units, tools or parts could drop into ductwork and cause an injury. Install a 90-degree elbow turn in the supply and return ductwork between the unit and the conditioned space. If a 90-degree elbow cannot be installed, then a grille of sufficient strength and density should be installed to prevent objects from falling into the conditioned space.

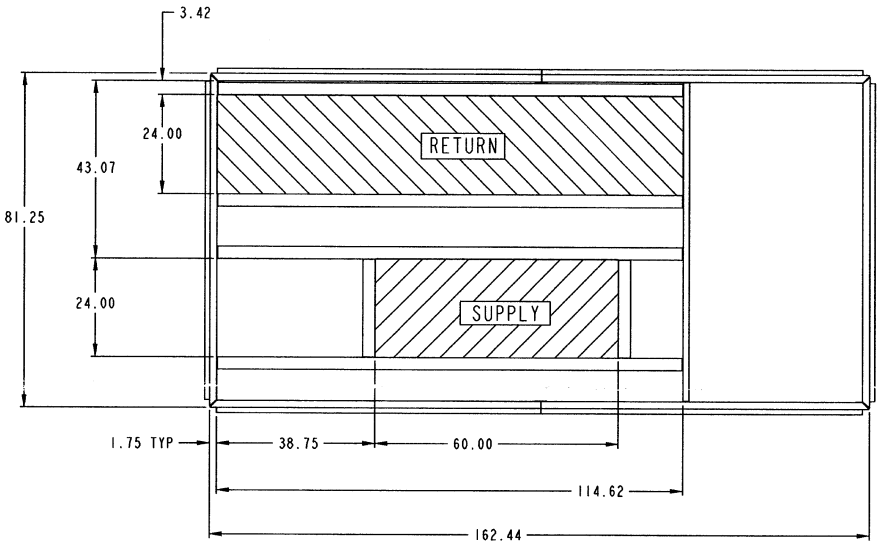
Step 4 — Make Unit Duct Connections

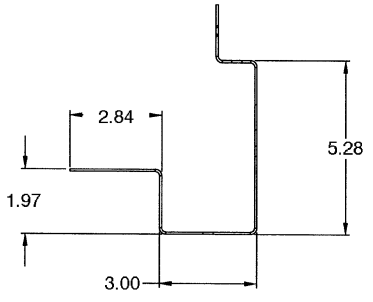
48EJ,EK UNITS — Unit is shipped for through-the-bottom duct connections. Field-fabricated ductwork should be attached to the **roof curb**. Supply and return duct dimensions are shown in Fig. 5-7. Air distribution is shown in Fig. 12. Refer to installation instructions shipped with roof curb for more information.

48EW,EY UNITS — Remove shipping covers from supply and return air openings. Attach field-supplied ductwork to unit. Connect to the unit with a single duct for **all** supply and return openings. Splitting of the airflow into branch ducts should not be done at the unit. Sufficient duct length should be used prior to branching to ensure the air temperatures are well mixed within the ductwork. See Fig. 8-10 for duct opening dimensions. Secure all ducts to building structure. Air distribution is shown in Fig. 8-10.

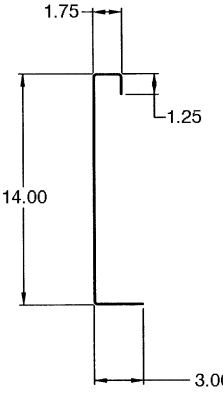
Install accessory barometric relief or power exhaust in the field-fabricated return ductwork. Refer to Step 11 — Position Power Exhaust/Barometric Relief Damper Hood section on page 39 for more information.

Instructions continued on page 19.

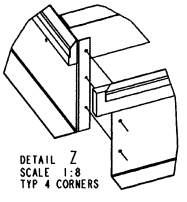


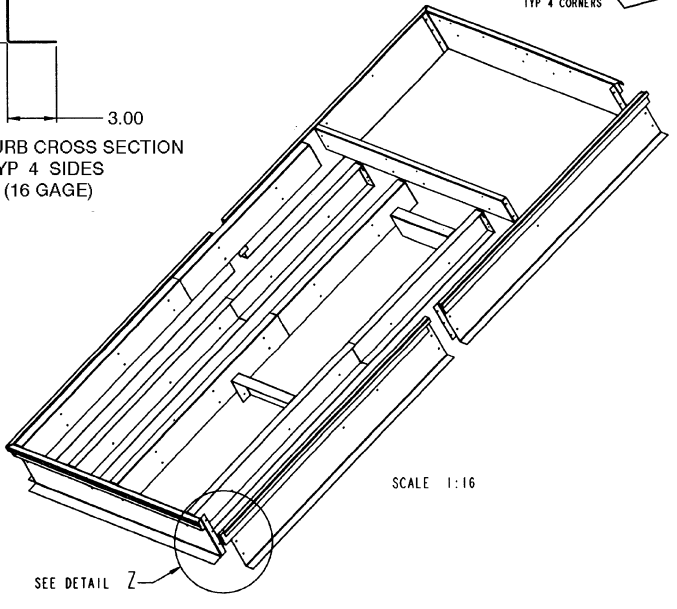


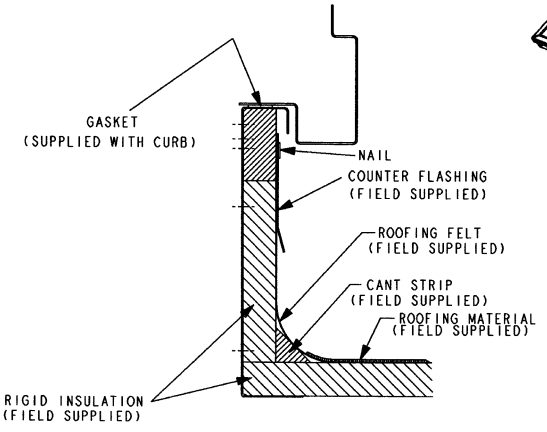
BASE RAIL CROSS SECTION
TYP 2 SIDES
(14 GAGE)

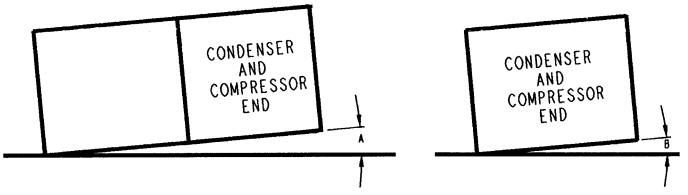


ROOF CURB CROSS SECTION
TYP 4 SIDES
(16 GAGE)









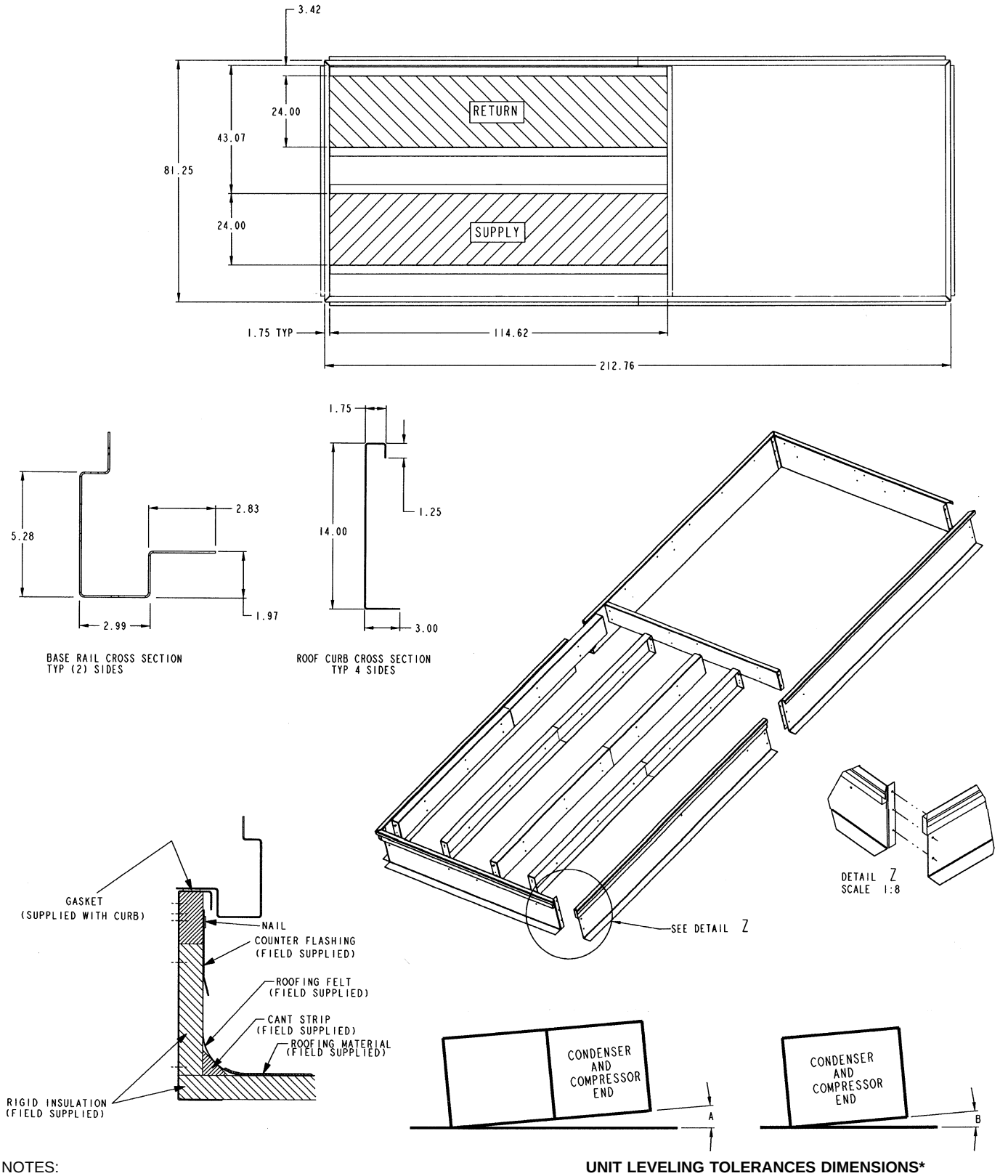
NOTES:
1. All roof curb parts are to be 16 ga galvanized steel.
2. Dimensions are in inches.
3. To prevent standing water in the drain pan of the indoor section and the heat exchangers, unit can only be pitched as shown.

UNIT LEVELING TOLERANCES DIMENSIONS*
(Degrees and Inches)

A		B	
Deg.	**in.**	**Deg.**	**in.**
1.0	2.9	.50	.75

*From edge of unit to horizontal.

Fig. 1 — Roof Curb (Sizes 024-034)



NOTES:
1. All roof curb parts are to be 16 ga galvanized steel.
2. Dimensions are in inches.
3. To prevent standing water in the drain pan of the indoor section and the heat exchangers, unit can only be pitched as shown.

UNIT LEVELING TOLERANCES DIMENSIONS*
(Degrees and Inches)

A		B	
Deg.	**in.**	**Deg.**	**in.**
1.0	2.9	.50	.75

*From edge of unit to horizontal.

Fig. 2 — Roof Curb (Sizes 038-048)

NOTES:
1. Unless otherwise specified, all dimensions are to outside of part.
2. Roof curb accessory CRRFCURB014A00 is shipped disassembled.
3. All roof curb parts are to be 14 gage galvanized steel.
4. Dimensions are in inches.
5. Dimensions in [ ] are millimeters.

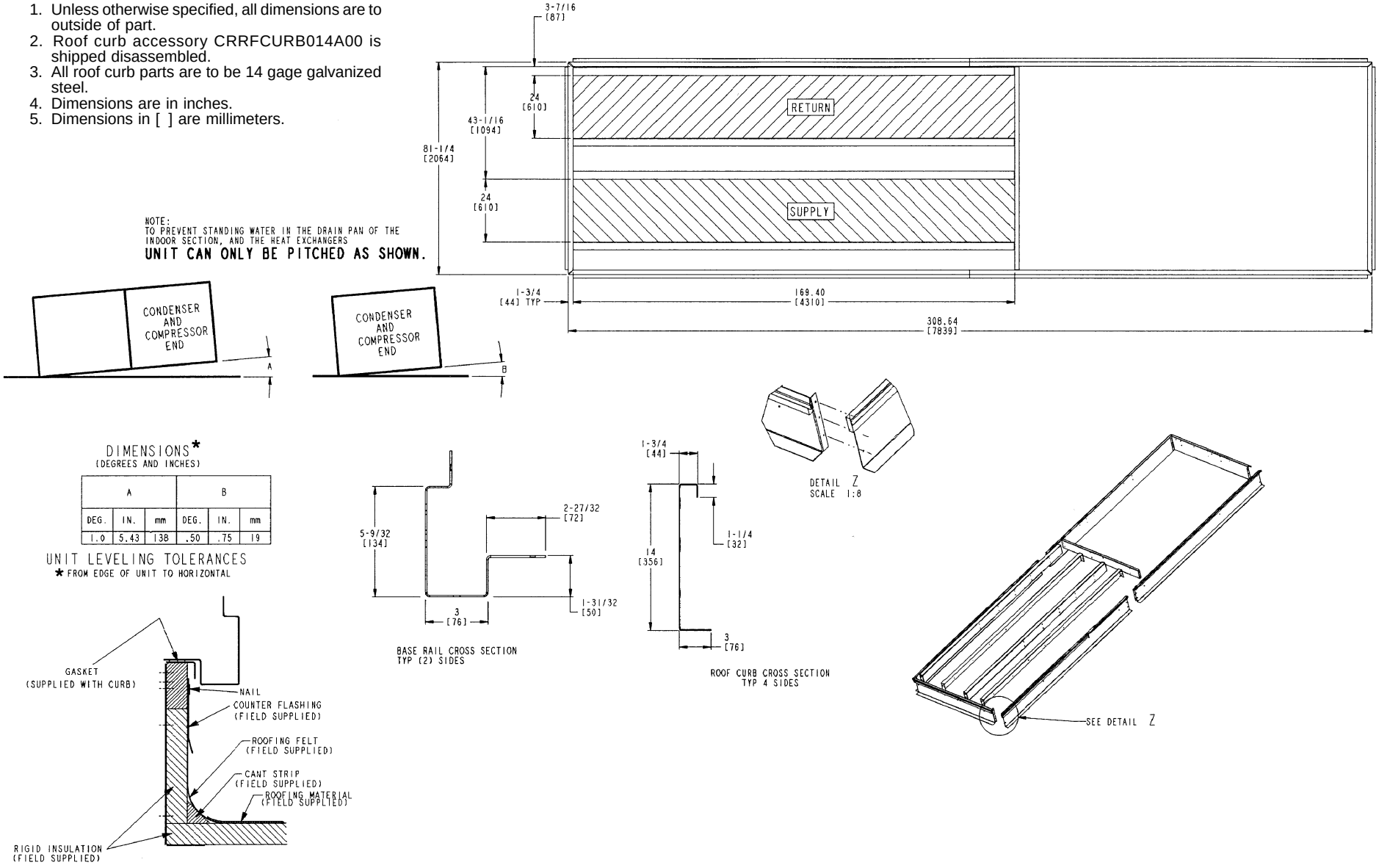


Fig. 3 — Roof Curb (Sizes 054-068)

NOTES:
1. Unless otherwise specified, all dimensions are to outside of part.
2. Seal strip to be placed covering reference holes.
3. Phantom lines represent seal strip. Total length required is 75 linear ft.
4. If existing sealstrip around roof curb seems damaged, replace it. Total length required is 62 linear ft.
5. Five crossrails are field located per dimensions shown and secured using self-tapping screws.
6. 48E series units will overfhang existing “DD” or “DF” roof curbs by 2.98″ at indoor motor end and 15.08″ at compressor end.
7. Ductwork (field supplied) must be notched to clear three crossrails.
8. Dimensions in [ ] are millimeters.

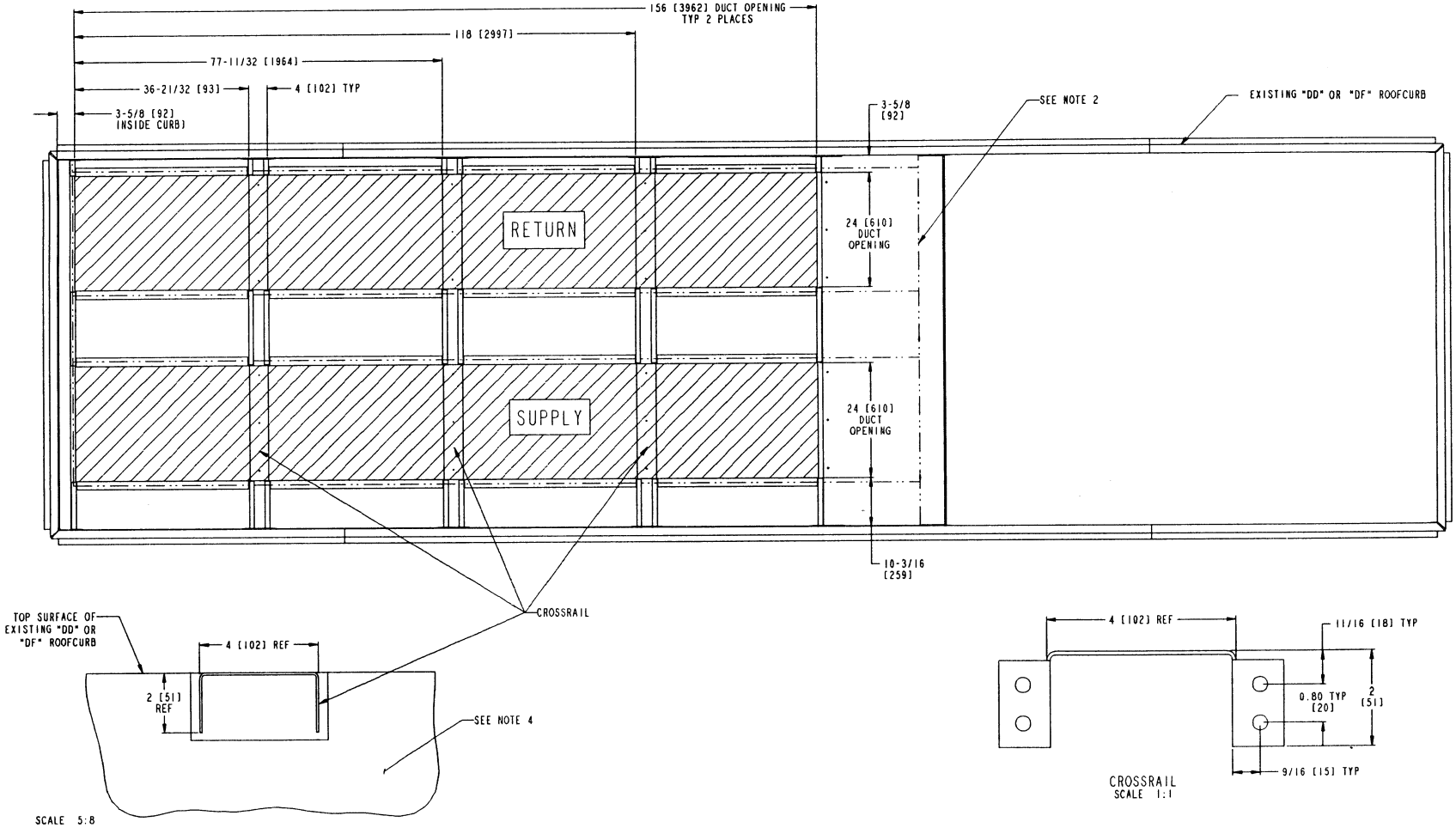


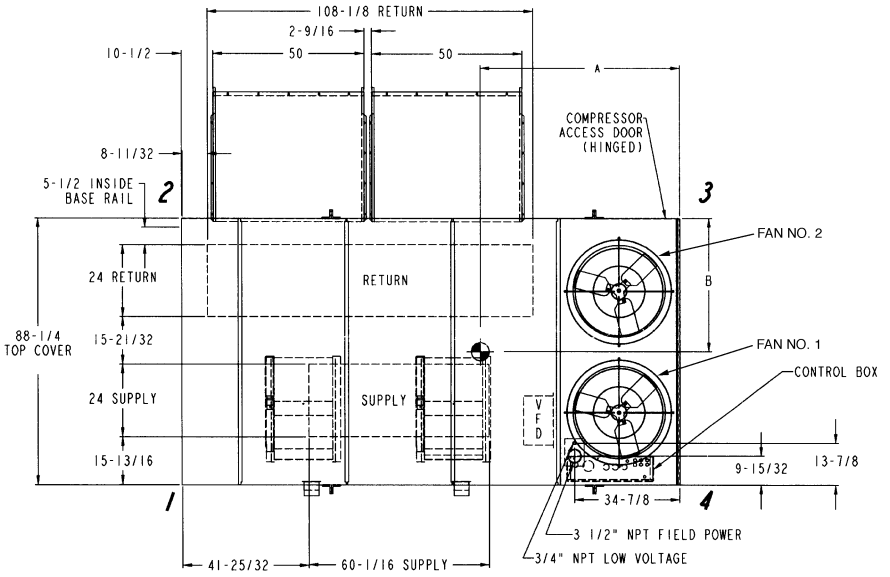
Fig. 4 — Roof Curb Adapter (Sizes 054-068 on 48DD,DF054-064 Retrofit, Part No. CRRCADPT005A00)

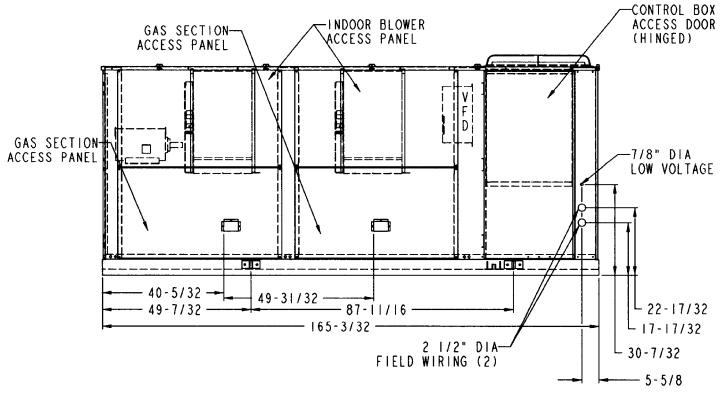
LEGEND

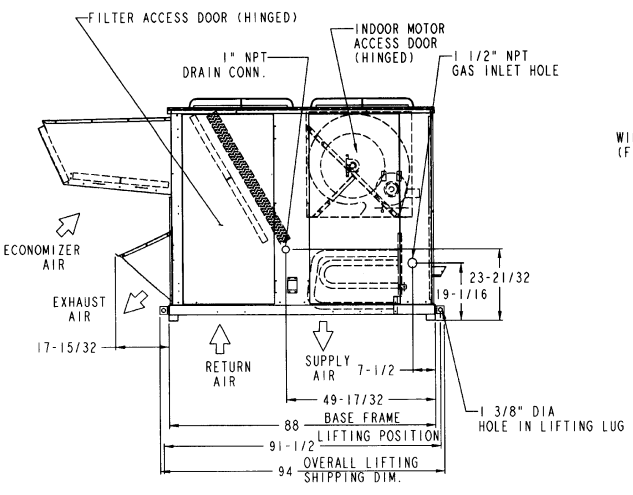
VFD — Variable Frequency Drive

NOTES:

1. Do not locate adjacent units with flue discharge facing economizer inlet. Minimum clearances to be:
   Adjacent Units: 15′-0″
   Top of Units: No overhang
   Condenser Coil: 4′-0″
   Economizer Side: 6′-0″
   Gas Heat Side: 4′-0″
   Filter Access Side: 10′-0″ (For Removal of Evaporator Coil)
2. For smaller service and operational clearances, contact Carrier Application Engineering department.
3. Bottom ducts designed to be attached to accessory roof curb. If unit is mounted on dunnage, it is recommended the ducts be supported by cross braces as done on accessory roof curb.
4. Dimensions are in inches.
5. Variable frequency drive (VFD) is only available for VAV (variable air volume) units.
6. For center of gravity and rigging information, see Fig. 11 on page 13. For operating weights see Table 2 on page 17.







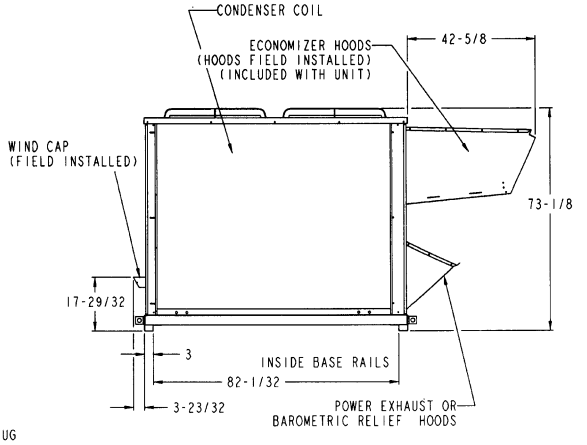
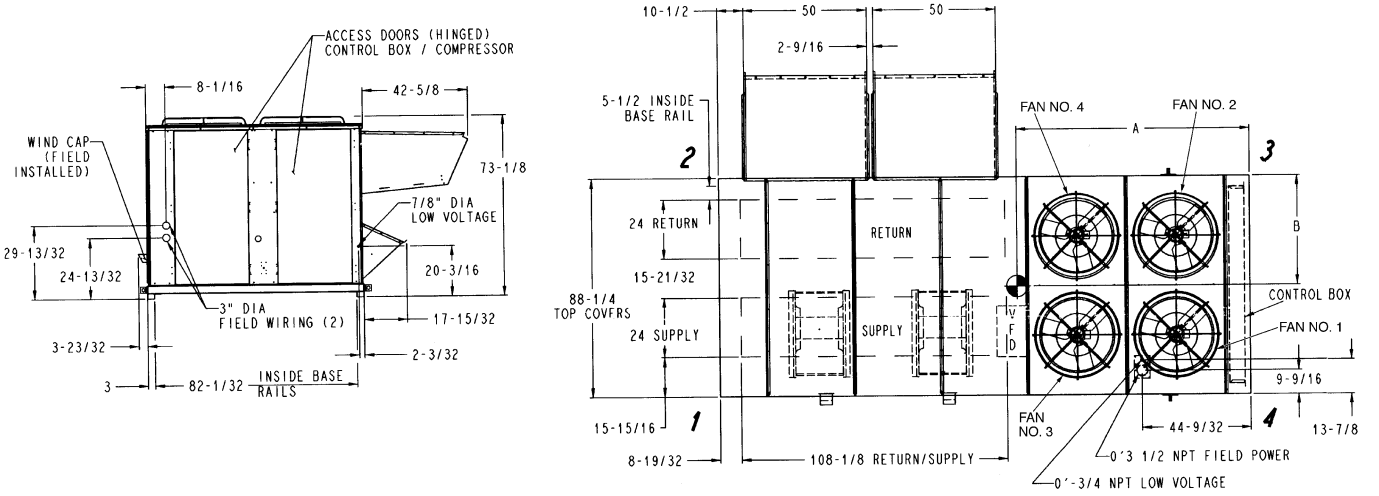
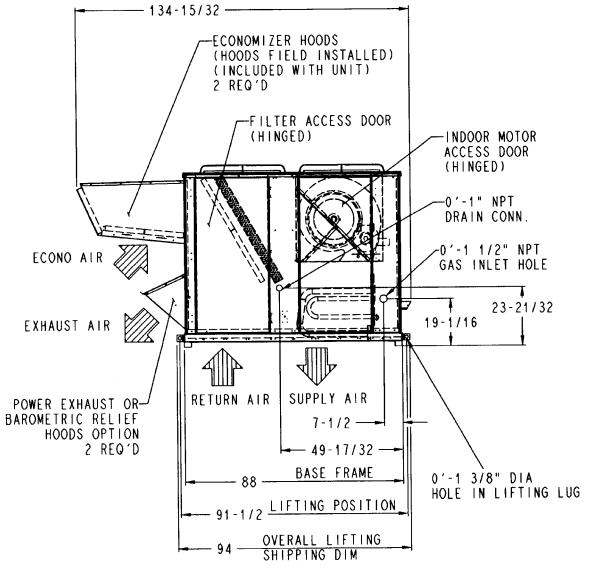
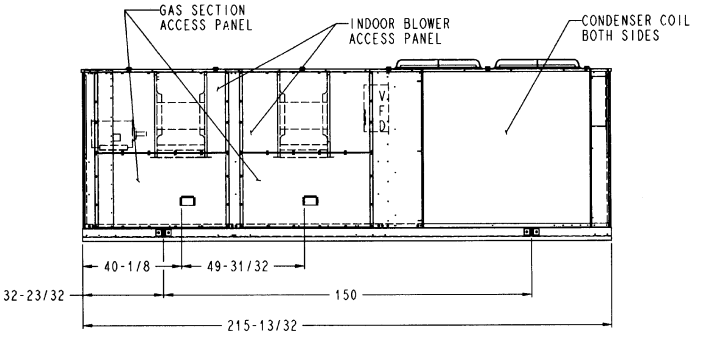


Fig. 5 — Base Unit Dimensions, 48EJ,EK024-034







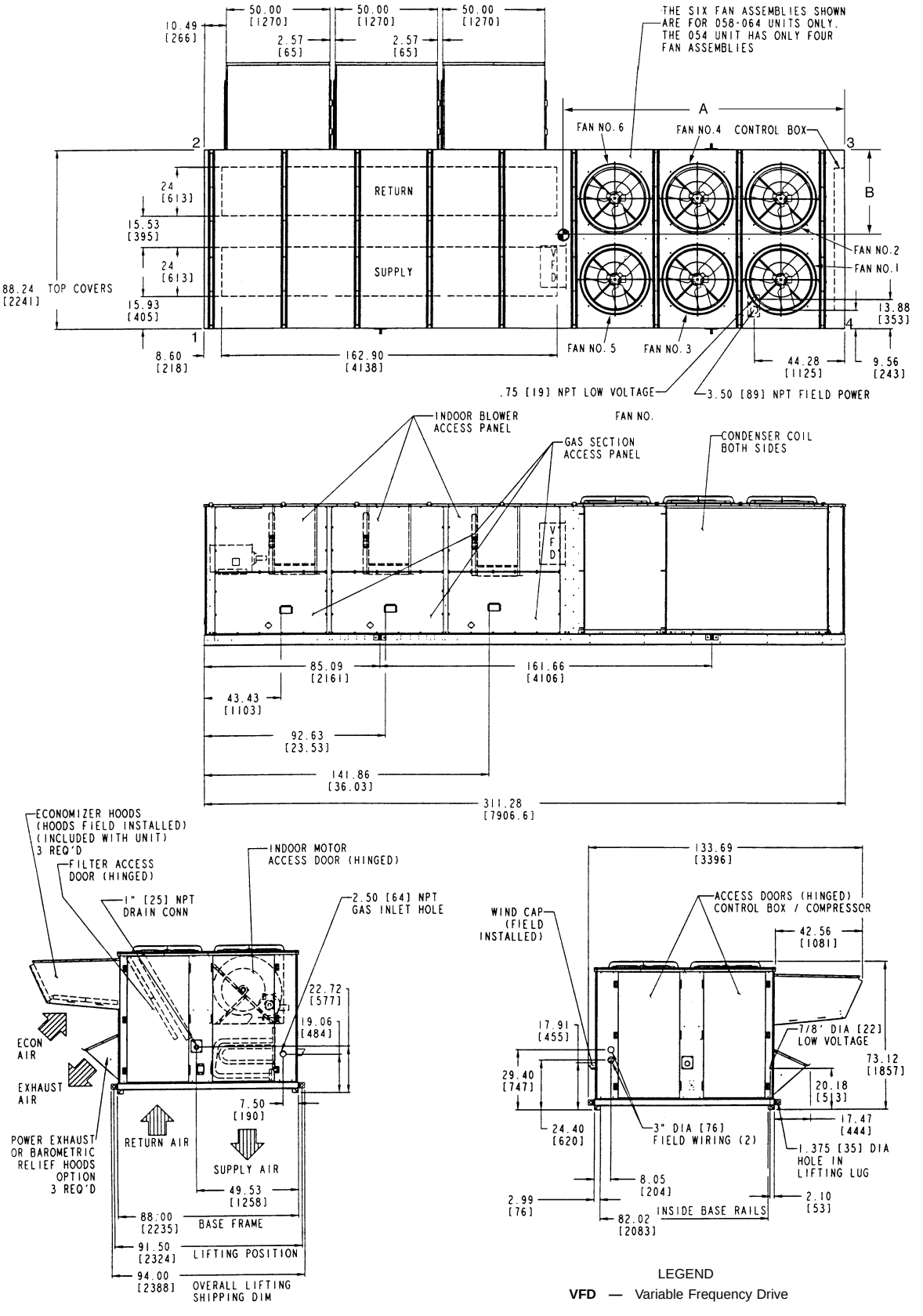
LEGEND

VFD — Variable Frequency Drive

NOTES:

1. Do not locate adjacent units with flue discharge facing economizer inlet. Minimum clearances to be:
   Adjacent Units: 15′-0″
   Top of Units: No overhang
   Condenser Coil: 4′-0″
   Economizer Side: 6′-0″
   Gas Heat Side: 4′-0″
   Filter Access Side: 10′-0″ (For Removal of Evaporator Coil)
2. For smaller service and operational clearances, contact Carrier Application Engineering department.
3. Bottom ducts designed to be attached to accessory roof curb. If unit is mounted on dunnage, it is recommended the ducts be supported by cross braces as done on accessory roof curb.
4. Dimensions are in inches.
5. Variable frequency drive (VFD) is only available for VAV (variable volume air) units.
6. For center of gravity and rigging information, see Fig. 11 on page 13. For operating weights see Table 2 on page 17.

Fig. 6 — Base Unit Dimensions, 48EJ,EK038-048



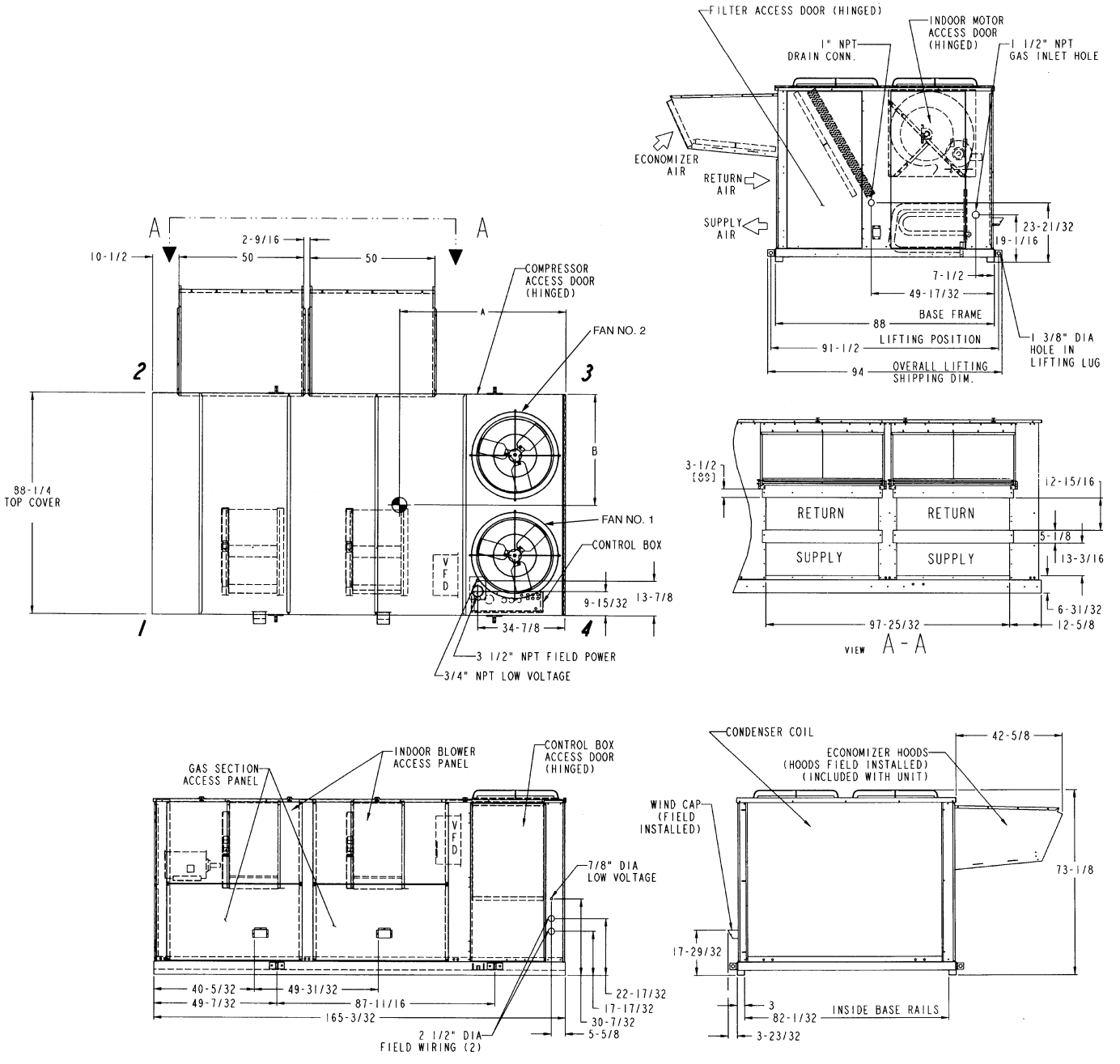
LEGEND

VFD — Variable Frequency Drive

NOTES:

1. Do not locate adjacent units with flue discharge facing economizer inlet. Minimum clearances to be:
   Adjacent Units: 15′-0″ [4572]
   Top of Units: No overhang
   Condenser Coil: 4′-0″ [1219]
   Economizer Side: 6′-0″ [1829]
   Heat Side: 4′-0″ [1219]
   Filter Access Side: 15′-0″ [4572] (For Removal of Evaporator Coil)
2. For smaller service and operational clearances, contact Carrier Application Engineering department.
3. Bottom ducts designed to be attached to accessory roof curb. If unit is mounted on dunnage, it is recommended the ducts must be supported by cross braces as done on accessory roof curb.
4. Dimensions in [ ] are in millimeters.
5. Variable frequency drive (VFD) is only available on VAV (variable air volume) units.
6. Dimensions are in inches.
7. For centers of gravity and rigging information, see Fig. 11 on page 13. For operating weights see Table 2 on page 17.

Fig. 7 — Base Unit Dimensions, 48EJ,EK054-068



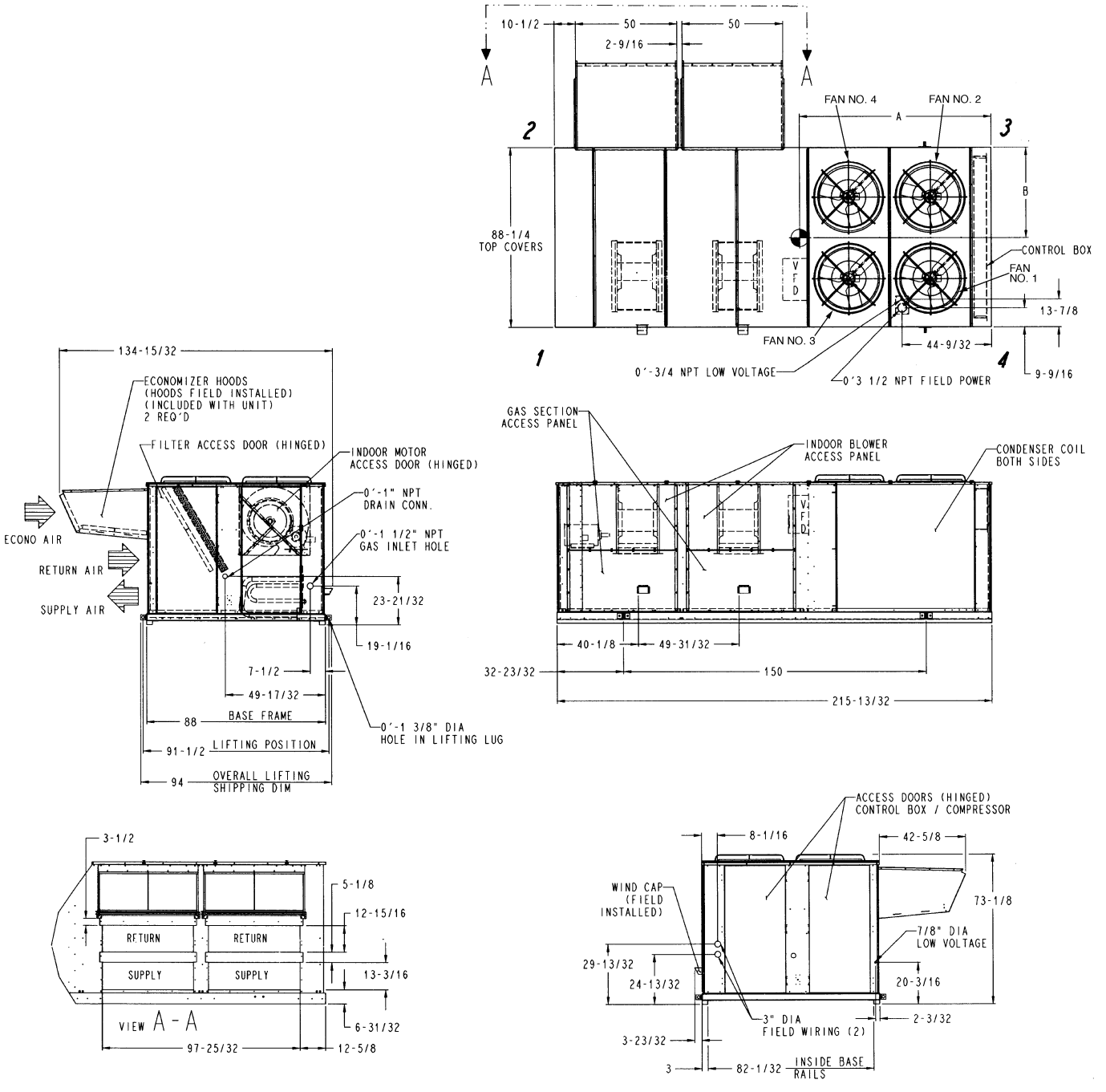
LEGEND

VFD — Variable Frequency Drive

NOTES:

1. Do not locate adjacent units with flue discharge facing economizer inlet. Minimum clearances to be:
   Adjacent Units: 15′-0″
   Top of Units: No overhang
   Condenser Coil: 4′-0″
   Economizer Side: 6′-0″
   Gas Heat Side: 4′-0″
   Filter Access Side: 10′-0″ (For Removal of Evaporator Coil)
2. For smaller service and operational clearances, contact Carrier Application Engineering department.
3. Dimensions are in inches.
4. For side-supply/return applications, a single return and supply ductwork connection is recommended for covering both return and both supply openings.
5. Variable frequency drive (VFD) is only available on VAV (variable air volume) units.
6. For center of gravity and rigging information see Fig. 11 on page 13. For operating weights see Table 2 on page 17.

Fig. 8 — Base Unit Dimensions, 48EW,EY024-034



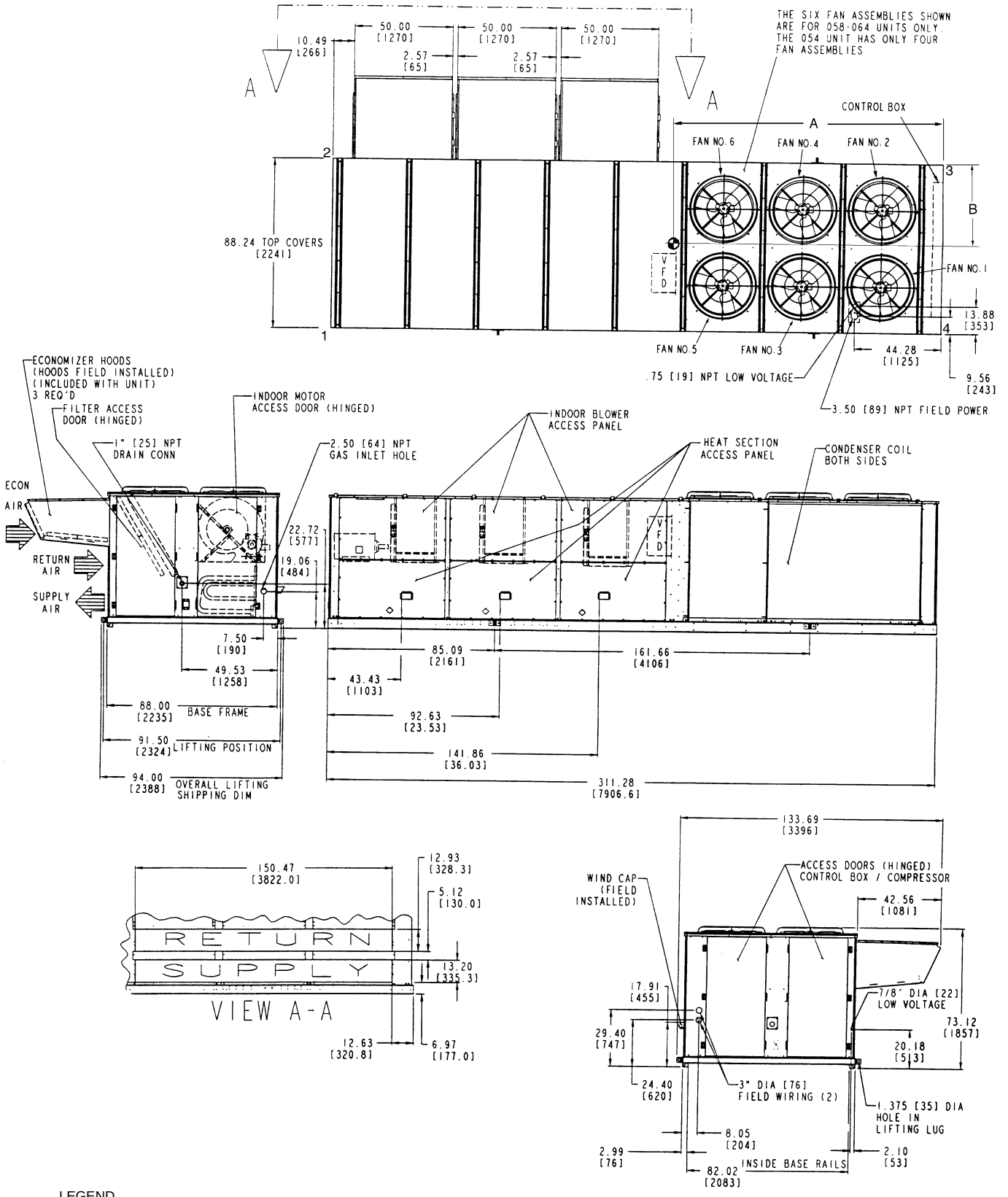
LEGEND

VFD — Variable Frequency Drive

NOTES:

1. Do not locate adjacent units with flue discharge facing economizer inlet. Minimum clearances to be:
   Adjacent Units: 15′-0″
   Top of Units: No overhang
   Condenser Coil: 4′-0″
   Economizer Side: 6′-0″
   Gas Heat Side: 4′-0″
   Filter Access Side: 10′-0″ (For Removal of Evaporator Coil)
2. For smaller service and operational clearances, contact Carrier Application Engineering department.
3. Dimensions are in inches.
4. For side-supply/return applications, a single return and supply ductwork connection is recommended for covering both return and both supply openings.
5. Variable frequency drive (VFD) is only available on VAV (variable air volume) units.
6. For center of gravity and rigging information see Fig. 11 on page 13. For operating weights see Table 2 on page 17.

Fig. 9 — Base Unit Dimensions, 48EW,EY038-048



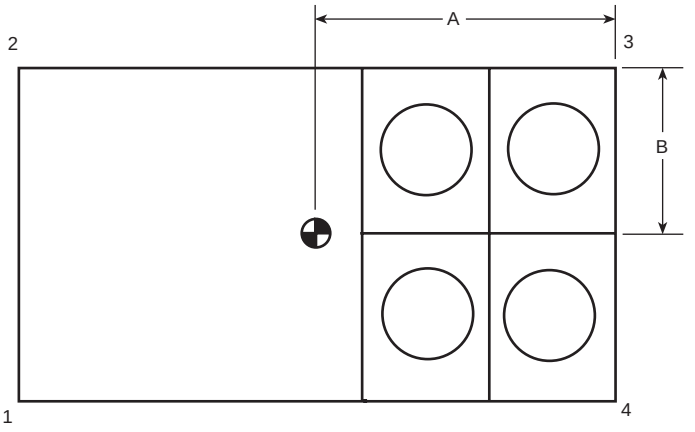
LEGEND

VFD — Variable Frequency Drive

NOTES:

1. Do not locate adjacent units with flue discharge facing economizer inlet. Minimum clearances to be:
   Adjacent Units: 15′-0″ [4572]
   Top of Units: No overhang
   Condenser Coil: 4′-0″ [1219]
   Economizer Side: 6′-0″ [1829]
   Heat Side: 4′-0″ [1219]
   Filter Access Side: 15′-0″ [4572] (For Removal of Evaporator Coil)
2. For smaller service and operational clearances, contact Carrier Application Engineering department.
3. Bottom ducts designed to be attached to accessory roof curb. If unit is mounted on dunnage, it is recommended the ducts must be supported by cross braces as done on accessory roof curb.
4. Dimensions in [ ] are in millimeters.
5. Dimensions are in inches.
6. Variable frequency drive (VFD) is only available on VAV (variable air volume) units.
7. For centers of gravity and rigging information, see Fig. 11 on page 13. For operating weights see Table 2 on page 17.

Fig. 10 — Base Unit Dimensions, 48EW,EY054-068



UNIT	CENTER OF GRAVITY				PERCENT OF TOTAL WEIGHT AT EACH CORNER (%)			
	Inches		Millimeters					
	A	B	A	B	1	2	3	4
48EJ,EW,EK,EYD024	72.4	42.2	1839	1072	21.0	22.8	29.2	26.9
48EJ,EWE024	73.3	42.7	1862	1085	21.6	22.9	28.6	27.0
48EJ,EW,EK,EYD028	69.6	44.0	1768	1118	21.1	21.1	28.9	28.9
48EJ,EWE028	70.1	44.3	1781	1125	21.4	21.1	28.6	29.0
48EJ,EW,EK,EYD030	69.6	44.0	1768	1118	21.1	21.1	28.9	28.9
48EJ,EWE030	70.1	44.3	1781	1125	21.4	21.1	28.6	29.0
48EJ,EW,EK,EYD034	69.6	44.0	1768	1118	21.1	21.1	28.9	28.9
48EJ,EWE034	70.1	44.3	1781	1125	21.4	21.1	28.6	29.0
48EJ,EW,EK,EYD038	92.7	46.9	2355	1191	23.0	20.1	26.6	30.3
48EJ,EWE038	94.1	47.2	2390	1199	23.5	20.3	26.1	30.2
48EJ,EW,EK,EYD044	89.3	46.9	2268	1191	22.1	19.4	27.3	31.2
48EJ,EWE044	90.8	47.2	2306	1199	22.7	19.6	26.8	31.0
48EJ,EW,EK,EYD048	87.7	46.5	2228	1181	21.6	19.2	27.9	31.3
48EJ,EWE048	89.2	46.8	2226	1189	22.1	19.4	27.4	31.1
48EJ,EW,EK,EYD054	130.9	46.9	3325	1192	22.4	19.6	27.0	30.9
48EJ,EWE054	133.8	47.4	3397	1204	23.1	19.8	26.3	30.7
48EJ,EW,EK,EYD058	132.1	47.5	3354	1207	22.9	19.5	26.5	31.1
48EJ,EWE058	139.5	49.6	3544	1260	25.3	19.6	24.1	31.1
48EJ,EW,EK,EYD064	125.3	45.2	3181	1149	20.7	19.6	29.1	30.7
48EJ,EWE064	132.2	47.2	3359	1199	22.8	19.7	26.7	30.8
48EJ,EW,EK,EYD068	127.7	46.6	3242	1184	21.7	19.3	27.7	31.2
48EJ,EWE068	134.7	48.6	3422	1235	23.9	19.4	25.4	31.3

RIGGING WEIGHTS

UNIT	MAXIMUM UNIT WEIGHTS (Lb)*										
	024	028	030	034	038	044	048	054	058	064	068
48EJ,EKD	5142	5228	5304	5304	5943	6237	6622	8029	8377	8755	8930
48EJE	5222	5384	5384	5384	6103	6397	6782	8269	8617	8995	9170
48EW,EYD	5182	5404	5344	5344	5983	6277	6662	8069	8417	8795	8970
48EWE	5262	5492	5424	5424	6143	6437	6822	8309	8657	9035	9210

*Includes outdoor-air hoods, filters, largest available indoor-fan motor, modulating power exhaust, and the largest available variable frequency drive (VFD).

NOTES:
1. ⊕ Center of gravity.
2. Sizes 024-048 includes 500 lb and sizes 054-068 includes 725 lb for modulating power exhaust.
3. Sizes 024-048 includes 170 lb and sizes 054-068 includes 255 lb for economizer hoods.
4. Economizer hood packaging includes 45 lb.
5. For sizes 024-034 add 220 lb for copper coil.
6. For sizes 038-044 add 284 lb for copper coil.
7. For 048 size add 380 lb for copper coil.
8. For 054 size add 271 lb for copper coil.
9. For 058 size add 407 lb for copper coil.
10. For 064 size add 489 lb for copper coil.
11. For 068 size add 651 lb for copper coil.

Fig. 11 — Rigging Information

Table 1 — Physical Data

UNIT 48EJ,EK,EW,EY	024D/E			028D/E			030D/E			034D/E		
NOMINAL CAPACITY (tons)	20			25			27.5			30		
OPERATING WEIGHT (lb)	For Operating Weights see Table 2.											
COMPRESSOR												
Type Ckt 1	06D328			06D328			06D537			06D537		
Ckt 2	06D818			06D328			06D328			06D537		
Number of Refrigerant Circuits	2			2			2			2		
Oil (oz) (Ckt 1, Ckt 2)	115, 88			115 ea.			115 ea.			115 ea.		
REFRIGERANT TYPE	R-22											
Operating Charge (lb-oz)												
Circuit 1*	25-0			25-0			25-0			25-0		
Circuit 2	31-0			25-0			25-0			25-0		
CONDENSER COIL	Cross-Hatched 3/8″ Copper Tubes, Aluminum Lanced, Aluminum Pre-Coated, or Copper Plate Fins											
Quantity	1			1			1			1		
Rows...Fins/in.	4...15			4...15			4...15			4...15		
Total Face Area (sq ft)	33.3			33.3			33.3			33.3		
CONDENSER FAN	Propeller Type											
Nominal Cfm	13,420			13,420			13,420			13,420		
Quantity...Diameter (in.)	2...30			2...30			2...30			2...30		
Motor Hp (1075 Rpm)	1			1			1			1		
EVAPORATOR COIL	Cross-Hatched 3/8″ Copper Tubes, Aluminum Plate Fins, Intertwined Circuits											
Rows...Fins/in.	4...15			4...15			4...15			4...15		
Total Face Area (sq ft)	31.7			31.7			31.7			31.7		
EVAPORATOR FAN	Centrifugal Type											
Quantity...Size (in.)	2...20x15			2...20x15			2...20x15			2...20x15		
Type Drive	Belt			Belt			Belt			Belt		
Nominal Cfm	8,000			10,000			11,000			12,000		
Motor Hp	5	10†	15	7.5	10†	15	10	15†	20	10	15†	20
Motor Frame Size (Standard)	S184T	S215T	D254T	S213T	S215T	D254T	S215T	D254T	S256T	S215T	D254T	S256T
(High Efficiency)	S184T	S215T	S254T	S213T	S215T	S254T	S215T	S254T	S256T	S215T	S254T	S256T
Motor Bearing Type	Ball			Ball			Ball			Ball		
Maximum Allowable Rpm	1200			1200			1200			1200		
Motor Pulley Pitch Diameter	4.9	4.4	5.7	5.4	6.1	5.5	4.4	4.9	5.9	4.4	5.7	5.9
Nominal Motor Shaft Diameter (in.)	1 1/8	1 3/8	1 5/8	1 3/8	1 3/8	1 5/8	1 3/8	1 5/8	1 5/8	1 3/8	1 5/8	1 5/8
Fan Pulley Pitch Diameter (in.)	12.4	8.6	9.1	12.4	11.1	8.7	9.4	8.1	8.7	9.0	9.1	8.7
Nominal Fan Shaft Diameter (in.)		1 15/16			1 15/16			1 15/16			1 15/16	
Belt, Quantity...Type	1...BX56	2...BX50	2...5VX530	1...BX56	1...5VX570	2...5VX530	2...BX50	2...5VX500	2...5VX530	2...BX50	2...5VX530	2...5VX530
Belt, Length (in.)	56	50	53	56	59	57	50	50	53	50	53	53
Pulley Center Line Distance (in.)	16.0-18.7	15.6-18.4	15.0-17.9	15.6-18.4		15.0-17.9	15.6-18.4	15.0-17.9		15.6-18.4	15.0-17.9	
Factory Speed Setting (rpm)	717	924	1096	773	962	1106	848	1059	1187	884	1096	1187
FURNACE SECTION												
Rollout Switch Cutout Temp (F)**	225			225			225			225		
Burner Orifice Diameter (in. ...drill size)												
Natural Gas Std	.111...34			.111...34			.111...34			.111...34		
Liquid Propane Alt	.089...43			.089...43			.089...43			.089...43		
Thermostat Heat Anticipator Setting (amps)												
Stage 1	0.1			0.1			0.1			0.1		
Stage 2	0.1			0.1			0.1			0.1		
Gas Input (Btuh) Stage 1 Low	265,600			265,600			265,600			265,600		
High	398,400			398,400			398,400			398,400		
Stage 2 Low	350,000			350,000			350,000			350,000		
High	525,000			525,000			525,000			525,000		
Efficiency (Steady State) (%)	82			82			82			82		
Temperature Rise Range	15-45/35-65			15-45/35-65			15-45/35-65			15-45/35-65		
Gas Pressure to Unit Range (in. wg)	5 - 13.5			5 - 13.5			5 - 13.5			5 - 13.5		
Manifold Pressure (in. wg)												
Natural Gas Std	3.5			3.5			3.5			3.5		
Liquid Propane Alt	3.5			3.5			3.5			3.5		
Gas Valve Quantity	2			2			2			2		
Field Gas Connection Size (in.-FPT)	1.5			1.5			1.5			1.5		
HIGH-PRESSURE SWITCH (psig)												
Cutout	426			426			426			426		
Reset (Auto.)	320			320			320			320		
LOW-PRESSURE SWITCH (psig)												
Cutout	7			7			7			7		
Reset (Auto.)	22			22			22			22		
RETURN-AIR FILTERS (W x H x T)												
Quantity...Size (in.)	10...20 x 24 x 2			10...20 x 24 x 2			10...20 x 24 x 2			10...20 x 24 x 2		
OUTDOOR-AIR FILTERS	8...16 x 25			8...16 x 25			8...16 x 25			8...16 x 25		
Quantity...Size (in.)	4...20 x 25			4...20 x 25			4...20 x 25			4...20 x 25		
POWER EXHAUST	Direct Drive, 3-Speed, Single-Phase Motor (Factory-Wired for High Speed) and Forward Curved Fan											
Motor, Quantity...Hp	4...1											
Fan, Diameter...Width (in.)	11...10											

*Sizes 024-034: Circuit 1 uses the lower portion of condenser coil, Circuit 2 uses the upper portion. Sizes 038-048: Circuit 1 uses the left condenser coil, Circuit 2 the right. All units have intertwined evaporator coils.

†Motor and drive shown will deliver approximately 2.5 in. wg net external static. For more information, see Table 3.

**Rollout switch is manual reset.

NOTE: High heat is for 48EJ,EW only.

Table 1 — Physical Data (cont)

UNIT 48EJ,EK,EW,EY	038D/E	044D/E	048D/E
NOMINAL CAPACITY (tons)	35	40	45
OPERATING WEIGHT (lb)	For Operating Weights see Table 2.		
COMPRESSOR			
Type Ckt 1	06D537	06EA250	06EA265
Ckt 2	06D537	06EA250	06EA250
Number of Refrigerant Circuits	2	2	2
Oil (oz) (Ckt 1, Ckt 2)	115 ea.	224 ea.	304, 224
REFRIGERANT TYPE	R-22		
Operating Charge (lb-oz)			
Circuit 1*	34-0	35-0	41-0
Circuit 2	34-0	35-0	41-0
CONDENSER COIL	Cross-Hatched 3/8″ Copper Tubes, Aluminum Lanced, Aluminum Pre-Coated, or Copper Plate Fins		
Quantity	2	2	1 | 1
Rows...Fins/in.	3...15	3...15	4...15 | 3...15
Total Face Area (sq ft)	58.3	58.3	66.7
CONDENSER FAN	Propeller Type		
Nominal Cfm	27,064	27,064	27,064
Quantity...Diameter (in.)	4...30	4...30	4...30
Motor Hp (1075 Rpm)	1	1	1
EVAPORATOR COIL	Cross-Hatched 3/8″ Copper Tubes, Aluminum Plate Fins, Intertwined Circuits		
Rows...Fins/in.	3...15	3...15	4...15
Total Face Area (sq ft)	34.7	34.7	34.7
EVAPORATOR FAN	Centrifugal Type		
Quantity...Size (in.)	2...20x15	2...20x15	2...20x15
Type Drive	Belt	Belt	Belt
Nominal Cfm	14,000	16,000	18,000
Motor Hp	10 | 15† | 20	15 | 20† | 25	20 | 25† | 30
Motor Frame Size (Standard)	S215T | D254T | S256T	D254T | S256T | S284T	S256T | S284T | S286T
(High Efficiency)	S215T | S254T | S256T	S254T | S256T | S284T	S256T | S284T | S286T
Motor Bearing Type	Ball	Ball	Ball
Maximum Allowable Rpm	1200	1200	1200
Motor Pulley Pitch Diameter	6.1 | 5.3 | 5.7	5.3 | 5.7 | 7.5	6.3 | 8.1 | 7.5
Nominal Motor Shaft Diameter (in.)	1 3/8 | 1 5/8 | 1 5/8	1 5/8 | 1 5/8 | 1 7/8	1 5/8 | 1 7/8 | 1 7/8
Fan Pulley Pitch Diameter (in.)	13.7 | 9.5 | 9.5	9.5 | 9.5 | 11.1	11.1 | 12.5 | 11.1
Nominal Fan Shaft Diameter (in.)	1 15/16	1 15/16	1 15/16
Belt, Quantity...Type	1...5VX610 | 2...5VX530 | 2...5VX550	2...5VX530 | 2...5VX550 | 2...5VX590	2...5VX570 | 2...5VX630 | 2...5VX590
Belt, Length (in.)	61 | 53 | 55	53 | 55 | 59	57 | 63 | 59
Pulley Center Line Distance (in.)	15.6-18.4 | 15.0-17.9	15.0-17.9 | 14.6-17.6	15.0-17.9 | 14.6-17.6
Factory Speed Setting (rpm)	779 | 976 | 1050	976 | 1050 | 1182	993 | 1134 | 1182
FURNACE SECTION			
Rollout Switch Cutout Temp (F)**	225	225	225
Burner Orifice Diameter (in. ...drill size)			
Natural Gas Std	.120...31	.120...31	.120...31
Liquid Propane Alt	.096...41	.096...41	.096...41
Thermostat Heat Anticipator Setting (amps)			
Stage 1	0.1	0.1	0.1
Stage 2	0.1	0.1	0.1
Gas Input (Btuh) Stage 1 Low	303,500	303,500	303,500
High	607,000	607,000	607,000
Stage 2 Low	400,000	400,000	400,000
High	800,000	800,000	800,000
Efficiency (Steady State) (%)	82	82	82
Temperature Rise Range	10-40/30-60	10-40/30-60	10-40/30-60
Gas Pressure to Unit Range (in. wg)	5 - 13.5	5 - 13.5	5 - 13.5
Manifold Pressure (in. wg)			
Natural Gas Std	3.5	3.5	3.5
Liquid Propane Alt	3.5	3.5	3.5
Gas Valve Quantity	2	2	2
Field Gas Connection Size (in.-FPT)	1.5	1.5	1.5
HIGH-PRESSURE SWITCH (psig)			
Cutout	426	426	426
Reset (Auto.)	320	320	320
LOW-PRESSURE SWITCH (psig)			
Cutout	7	7	7
Reset (Auto.)	22	22	22
RETURN-AIR FILTERS (W x H x T)			
Quantity...Size (in.)	10...20 x 24 x 2	10...20 x 24 x 2	10...20 x 24 x 2
OUTDOOR-AIR FILTERS	8...16 x 25	8...16 x 25	8...16 x 25
Quantity...Size (in.)	4...20 x 25	4...20 x 25	4...20 x 25
POWER EXHAUST	Direct Drive, 3-Speed, Single-Phase Motor (Factory-Wired for High Speed) and Forward Curved Fan		
Motor, Quantity...Hp	4...1		
Fan, Diameter...Width (in.)	11...10		

*Sizes 024-034: Circuit 1 uses the lower portion of condenser coil, Circuit 2 uses the upper portion. Sizes 038-048: Circuit 1 uses the left condenser coil, Circuit 2 the right. All units have intertwined evaporator coils.
†Motor and drive shown will deliver approximately 2.5 in. wg net external static. For more information, see Table 3.
**Rollout switch is manual reset.

NOTE: High heat is for 48EJ,EW only.

Table 1 — Physical Data (cont)

UNIT 48EJ,EK,EW,EY	054D/E			058D/E			064D/E			068D/E		
NOMINAL CAPACITY (tons)	50			55			60			65		
OPERATING WEIGHT (lb)	For Operating Weights see Table 2.											
COMPRESSOR												
Quantity...Type (Ckt 1, Ckt 2)	1...06EA265, 1...06EA250			1...06EA275, 1...06EA250			1...06EA275, 1...06EA265			2...06EA275		
Number of Refrigerant Circuits	2			2			2			2		
Oil (oz) (Ckt 1, Ckt 2)	304, 224			304, 224			304, 304			304, 304		
REFRIGERANT TYPE	R-22											
Operating Charge (lb-oz)												
Circuit 1*	50-11			57-0			68-0			81-0		
Circuit 2	46-8			48-6			68-0			73-0		
CONDENSER COIL	Cross-Hatched ⅜-in. Copper Tubes, Aluminum Lanced, Aluminum Pre-Coated, or Copper Plate Fins											
Quantity	1 | 1			1 | 1			2			2		
Rows...Fins/in.	3...15 | 2...15			3...15 | 2...15			3...15			4...15		
Total Face Area (sq ft)	66.6			100.0			100			100		
CONDENSER FAN	Propeller Type											
Nominal Cfm	30,000			43,900			43,900			43,900		
Quantity...Diameter (in.)	4...30			6...30			6...30			6...30		
Motor Hp (1075 Rpm)	1			1			1			1		
EVAPORATOR COIL	Cross-Hatched ½-in. Copper Tubes, Aluminum Plate Fins, Intertwined Circuits											
Rows...Fins/in.	4...17			4...17			4...17			4...17		
Total Face Area (sq ft)	45.0			45.0			48.1			48.1		
EVAPORATOR FAN	Centrifugal Type											
Quantity...Size (in.)	3...20 x 15			3...20 x 15			3...20 x 15			3...20 x 15		
Type Drive	Belt			Belt			Belt			Belt		
Nominal Cfm	20,000			22,000			24,000			26,000		
Motor Hp	15	20†	25	20	25†	30	25	30†	40	25	30†	40
Motor Frame Size	S254T	S256T	S284T	S256T	S284T	S286T	S284T	S286T	S324T	S284T	S286T	S324T
Motor Bearing Type		Ball			Ball			Ball			Ball	
Maximum Allowable Rpm		1200			1200			1200			1200	
Motor Pulley Pitch Diameter	4.7	6.1	8.1	5.9	6.7	7.5	5.3	8.1	9.4	6.7	5.9	9.4
Nominal Motor Shaft Diameter (in.)	1⅝	1⅝	1⅞	1⅝	1⅞	1⅞	1⅞	1⅞	2⅛	1⅞	1⅞	2⅛
Fan Pulley Pitch Diameter (in.)	11.1	11.1	12.5	11.1	11.1	11.1	9.1	12.5	13.6	12.5	9.5	13.6
Nominal Fan Shaft Diameter (in.)		1 15/16			1 15/16			1 15/16			1 15/16	
Belt, Quantity...Type	2...5VX550	2...5VX570	2...5VX630	2...5VX570	2...5VX590	2...5VX590	3...5VX530	2...5VX630	2...5VX650	2...5VX610	3...5VX550	2...5VX650
Length (in.)	55	57	63	57	59	59	53	63	65	61	55	59
Pulley Center Line Distance (in.)	15.2-17.5	15.2-17.5	14.7-17.2	15.2-17.5	14.7-17.2	14.7-17.2	14.7-17.2	14.7-17.2	14.2-17.0	14.7-17.2	14.7-17.2	14.3-17.0
Factory Speed Setting (rpm)	741	962	1134	930	1056	1182	1019	1134	1214	938	1087	1214
FURNACE SECTION												
Rollout Switch Cutout Temp (F)**	225			225			225			225		
Burner Orifice Diameter (in. ...drill size)												
Natural Gas Std	.120...31			.120...31			.120...31			.120...31		
Liquid Propane Alt	.096...41			.096...41			.096...41			.096...41		
Thermostat Heat Anticipator Setting (amps)												
Stage 1	0.1			0.1			0.1			0.1		
Stage 2	0.1			0.1			0.1			0.1		
Gas Input (Btuh) Stage 1	441,000/ 873,000			441,000/ 873,000			441,000/ 873,000			441,000/ 873,000		
Stage 2	582,000/1,164,000			582,000/1,164,000			582,000/1,164,000			582,000/1,164,000		
Efficiency (Steady State) (%)	82			82			82			82		
Temperature Rise Range	10-40/30-60			10-40/30-60			10-40/30-60			10-40/30-60		
Gas Pressure to Unit Range (in. wg)	5 - 13.5			5 - 13.5			5 - 13.5			5 - 13.5		
Manifold Pressure (in. wg)												
Natural Gas Std	3.3			3.3			3.3			3.3		
Liquid Propane Alt	3.3			3.3			3.3			3.3		
Gas Valve Quantity	3			3			3			3		
Field Gas Connection Size (in. - FPT)	2.5			2.5			2.5			2.5		
HIGH-PRESSURE SWITCH (psig)												
Cutout	426			426			426			426		
Reset (Auto.)	320			320			320			320		
LOW-PRESSURE SWITCH (psig)												
Cutout	7			7			7			7		
Reset (Auto.)	22			22			22			22		
RETURN-AIR FILTERS (W x H x T)												
Quantity...Size (in.)	16...24 x 20 x 2			16...24 x 20 x 2			16...24 x 20 x 2			16...24 x 20 x 2		
POWER EXHAUST	Direct Drive, 3-Speed, Single-Phase Motor (Factory-Wired for High Speed) and Forward Curved Fan											
Motor, Quantity...Hp	6...1											
Fan, Diameter...Width (in.)	11...10											

*Circuit 1 uses the left condenser coil. Circuit 2 the right. All units have intertwined evaporator coils.
†Motor and drive shown will deliver approximately 2.5 in. wg net external static pressure. For more information see Table 3.
**Rollout switch is manual reset.

NOTE: High heat is for 48EJ,EW.

Table 2 — Operating Weights

UNIT	BASE UNIT WEIGHTS (Lb)*										
	024	028	030	034	038	044	048	054	058	064	068
48EJ,EKD	4287	4373	4373	4373	5012	5238	5525	6805	7055	7305	7480
48EJE	4367	4453	4453	4453	5172	5398	5685	7045	7295	7545	7720
48EW,EYD	4327	4413	4413	4413	5052	5278	5565	6845	7095	7345	7520
48EWE	4407	4493	4493	4493	5212	5438	5725	7085	7335	7585	7760

OPTION/ ACCESSORY	OPTION/ACCESSORY WEIGHTS (Lb)										
	024	028	030	034	038	044	048	054	058	064	068
Barometric Relief	300	300	300	300	300	300	300	450	450	450	450
Power Exhaust	450	450	450	450	450	450	450	675	675	675	675
Modular Power Exhaust	500	500	500	500	500	500	500	725	725	725	725
Electric Heat	110	110	110	110	110	110	110	165	165	165	165
Cu Tubing/Cu Fin Condenser Coil	220	220	220	220	285	285	380	271	407	489	651
Roof Curb (14-in. curb)	365	365	365	365	410	410	410	585	585	585	585

CV MOTOR WEIGHTS (Lb)			
MOTOR HP	UNIT VOLTAGE	STANDARD EFFICIENCY IFM	HIGH EFFICIENCY IFM
5	230/460	78	94
	575	78	92
7.5	230/460	107	135
	575	107	136
10	230/460	118	164
	575	118	156
15	230/460	150	217
	575	150	220
20	230/460	212	250
	575	212	258
25	230/460	240	309
	575	240	319
30	230/460	283	355
	575	283	359
40	230/460	372	415
	575	372	410

VAV MOTOR WEIGHTS (Lb)			
MOTOR HP	UNIT VOLTAGE	STANDARD EFFICIENCY IFM	HIGH EFFICIENCY IFM
5	230/460	125	141
	575	163	177
7.5	230/460	183	211
	575	193	222
10	230/460	204	250
	575	204	242
15	230/460	238	305
	575	240	310
20	230/460	348	386
	575	304	350
25	230/460	377	446
	575	375	454
30	230/460	480	552
	575	418	494
40	230/460	637	680
	575	587	625

LEGEND

Cu — Copper
CV — Constant Volume
FIOP — Factory-Installed Option
HP — Horsepower
IFM — Indoor Fan Motor
VAV — Variable Air Volume
VFD — Variable Frequency Drive

*Outdoor-air hoods and filters included in base unit weights; indoor-fan motors are NOT included.

NOTES:
1. Base unit weight includes outdoor-air hoods. Base unit weight does NOT include indoor-fan motor. ADD indoor-fan motor, FIOPs, and accessories for TOTAL operating weight.
2. The VAV motor weights include indoor fan motor and the VFD (variable frequency drive), compressor electric unloaders, VFD transducers, and associated wiring.

Table 3 — Evaporator Fan Motor Data (Units with Starting Serial Numbers 4197 and Later)

UNIT SIZE 48EJ,EK, EW,EY	MOTOR HP	MOTOR SHAFT DIA. (in.)	FAN SHAFT SPEED (rpm)	MOTOR SHEAVE	MOTOR SHEAVE PITCH DIAMETER (in.)	BUSHING DIAAMETER (in.)	FAN SHEAVE	FAN SHEAVE PITCH DIAMETER (in.)	BUSHING DIAMETER (in.)	BELT (Quantity)	BELT TENSION (lb at .25 in.)
024	5	1.125	717	BK55	4.9	NONE — 1.125	1B5V124	12.4	B—1.9375	BX56	8
	10	1.375	924	2BK50	4.4	NONE — 1.375	2B5V86	8.6	B—1.9375	(2) BX50	8
	15	1.625	1096	2B5V56	5.7	B — 1.625	2B5V90	9.1	B—1.9375	(2) 5VX530	9
028	7.5	1.375	773	BK60H	5.4	H — 1.375	1B5V124	12.4	B—1.9375	BX56	10
	10	1.375	962	1B5V60	6.1	H — 1.375	1B5V110	11.1	B—1.9375	5VX570	11
	15	1.625	1106	2B5V54	5.5	B — 1.625	2B5V86	8.7	B—1.9375	(2) 5VX530	9
030	10	1.375	848	2BK50	4.4	NONE — 1.375	2B5V94	9.4	B—1.9375	(2) BX50	8
	15	1.625	1059	2B5V48	4.9	B — 1.625	2B5V80	8.1	B—1.9375	(2) 5VX500	10
	20	1.625	1187	2B5V58	5.9	B — 1.625	2B5V86	8.7	B—1.9375	(2) 5VX530	11
034	10	1.375	884	2BK50	4.4	H — 1.375	2B5V90	9.0	B—1.9375	(2) BX50	8
	15	1.625	1096	2B5V56	5.7	B — 1.625	2B5V90	9.1	B—1.9375	(2) 5VX530	9
	20	1.625	1187	2B5V58	5.9	B — 1.625	2B5V86	8.7	B—1.9375	(2) 5VX530	11
038	10	1.375	779	1B5V60	6.1	NONE — 1.375	1B5V136	13.7	B—1.9375	5VX610	12
	15	1.625	976	2B5V52	5.3	B — 1.625	2B5V94	9.5	B—1.9375	(2) 5VX530	10
	20	1.625	1050	2B5V56	5.7	B — 1.625	2B5V94	9.5	B—1.9375	(2) 5VX550	11
044	15	1.625	976	2B5V52	5.3	B — 1.625	2B5V94	9.5	B—1.9375	(2) 5VX530	10
	20	1.625	1050	2B5V56	5.7	B — 1.625	2B5V94	9.5	B—1.9375	(2) 5VX550	11
	25	1.875	1182	2B5V74	7.5	B — 1.875	2B5V110	11.1	B—1.9375	(2) 5VX590	11
048	20	1.625	993	2B5V62	6.3	B — 1.625	2B5V110	11.1	B—1.9375	(2) 5VX570	11
	25	1.875	1134	2B5V80	8.1	B — 1.875	2B5V124	12.5	B—1.9375	(2) 5VX630	11
	30	1.875	1182	2B5V74	7.5	B — 1.875	2B5V110	11.1	B—1.9375	(2) 5VX590	13
054	15	1.625	741	2B5V46	4.7	B — 1.625	2B5V110	11.1	B—1.9375	(2) 5VX550	11
	20	1.625	962	2B5V60	6.1	B — 1.625	2B5V110	11.1	B—1.9375	(2) 5VX570	12
	25	1.875	1134	2B5V80	8.1	B — 1.875	2B5V124	12.5	B—1.9375	(2) 5VX630	12
058	20	1.625	930	2B5V58	5.9	B — 1.625	2B5V110	11.1	B—1.9375	(2) 5VX570	13
	25	1.875	1056	2B5V66	6.7	B — 1.875	2B5V110	11.1	B—1.9375	(2) 5VX590	14
	30	1.875	1182	2B5V74	7.5	B — 1.875	2B5V110	11.1	B—1.9375	(2) 5VX590	14
064	25	1.875	1019	3B5V52	5.3	B — 1.875	3B5V90	9.1	B—1.9375	(3) 5VX530	12
	30	1.875	1134	2B5V80	8.1	B — 1.875	2B5V124	12.5	B—1.9375	(2) 5VX630	14
	40	2.125	1214	2B5V94	9.4	B — 2.125	2B5V136	13.6	B—1.9375	(2) 5VX650	15
068	25	1.875	938	2B5V66	6.7	B — 1.875	2B5V124	12.5	B—1.9375	(2) 5VX610	14
	30	1.875	1087	3B5V58	5.9	B — 1.875	3B5V94	9.5	B—1.9375	(3) 5VX550	13
	40	2.125	1214	2B5V94	9.4	B — 2.125	2B5V136	13.6	B—1.9375	(2) 5VX650	15

NOTES:
1. Motor shaft speed is 1750 rpm. The fan shaft diameter is 1-15/16 inches.
2. All indoor fan motors meet the minimum efficiency requirements as established by the Energy Policy Act of 1992 (EPACT), effective October 24, 1997.

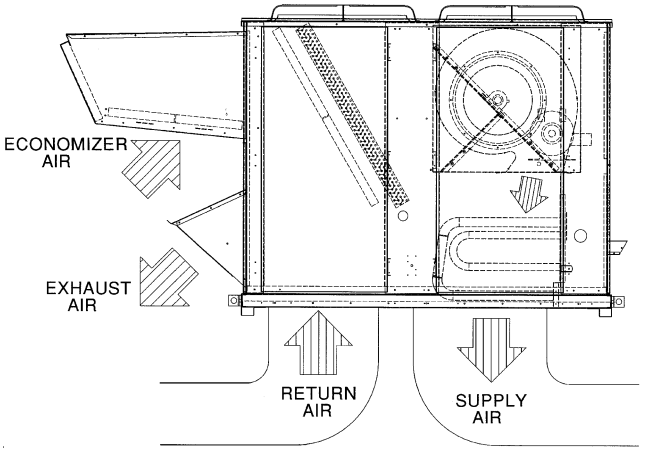


Fig. 12 — Air Distribution — Thru-the-Bottom

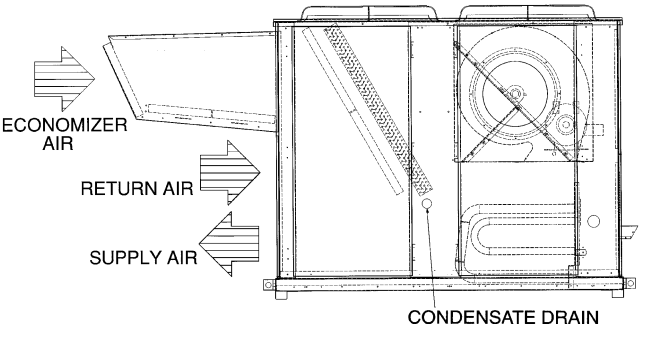


Fig. 13 — Air Distribution — Thru-the-Side

Step 5 — Install Flue Hood

48EJ,EK,EW,EY024-048 UNITS — Flue hood is shipped inside gas section of unit. To install, secure flue hood to access panel. See Fig. 14A.

48EJ,EK,EW,EY054-068 UNITS — Flue hood and wind baffle are shipped inside gas section of unit. To install, secure flue hood to access panel. See Fig. 14B. Install the two pieces of the wind baffle over the flue hood.

NOTE: When properly installed, flue hood will line up with combustion fan housing. See Fig. 15.

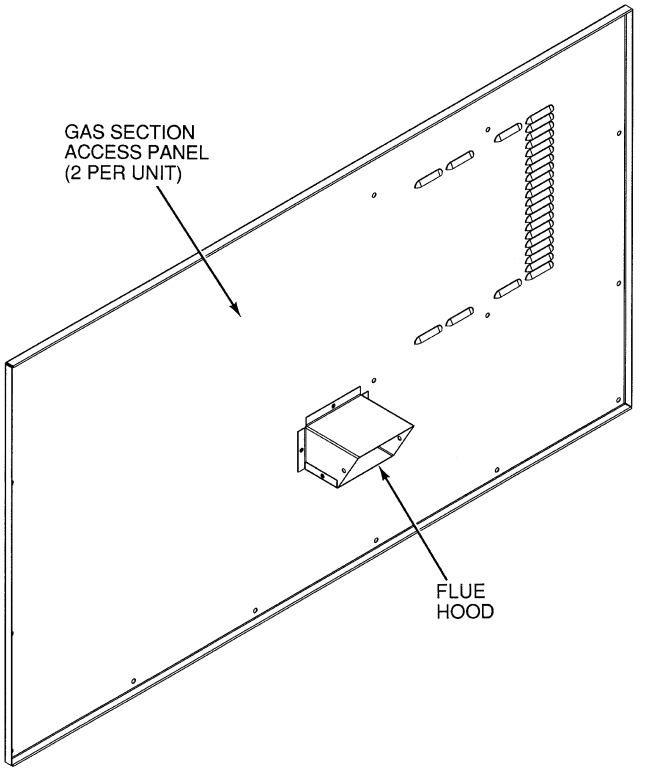


Fig. 14A — Flue Hood Location (Sizes 024-048)

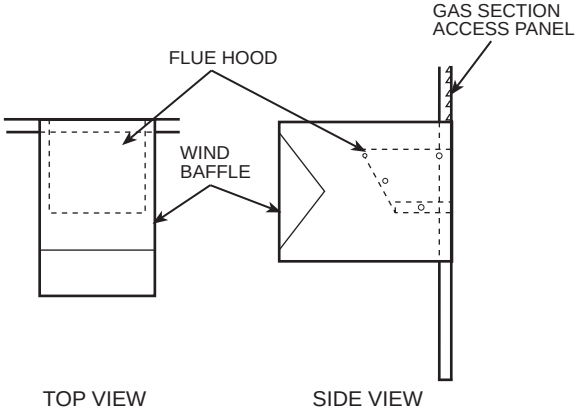


Fig. 14B — Flue Hood Location (Sizes 054-068)

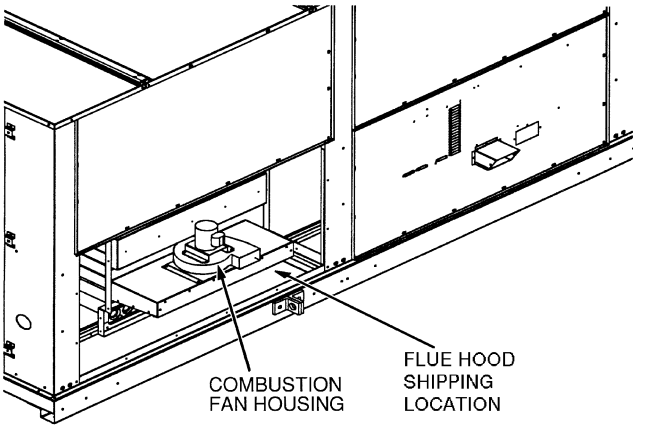


Fig. 15 — Combustion Fan Housing Location

Step 6 — Trap Condensate Drain — See Fig. 5-10 for drain location. Condensate drain is open to atmosphere and must be trapped. Install a trapped drain at the drain location. A trap at least 4-in. deep must be used. See Fig. 16. Trap must be installed to prevent freeze-up.

Condensate pans are sloped so that water will completely drain from the condensate pan to comply with indoor air quality guidelines. The condensate drain pan is fitted with a 1-in. FPT coupling.

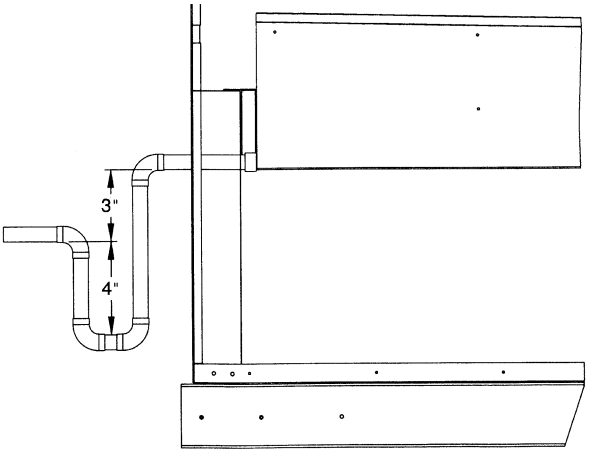


Fig. 16 — Condensate Drain Trap Piping Details (Typical Roof Curb or Slab Mount Shown)

Step 7 — Install Gas Piping — Unit is equipped for use with natural gas. Installation must conform with local building codes or, in the absence of local codes, with the National Fuel Gas Code, ANSI Z223.1.

Install manual gas shutoff valve with a ⅛-in. NPT pressure tap for test gage connection at unit. Field gas piping must include sediment trap and union. See Fig. 17. An ⅛-in. NPT is also located on the gas manifold adjacent to the gas valve.

⚠ WARNING

Do not pressure test gas supply while connected to unit. Always disconnect union before servicing.

IMPORTANT: Natural gas pressure at unit gas connection must not be less than 5 in. wg or greater than 13.5 in. wg.

Size gas-supply piping for 0.5-in. wg maximum pressure drop. Do not use supply pipe smaller than unit gas connection.

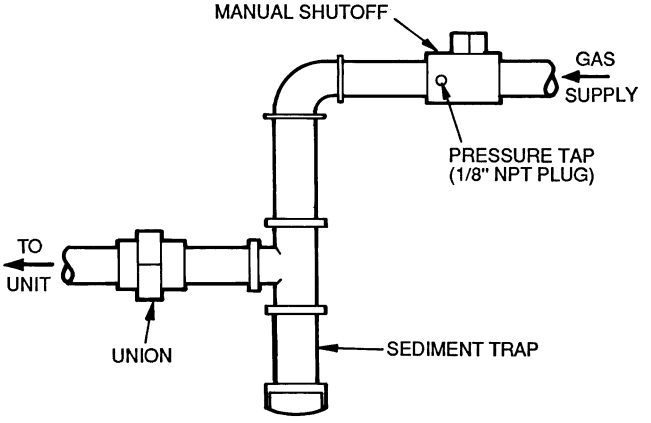


Fig. 17 — Field Gas Piping

Step 8 — Controls Options — The control options that the units can provide are based on the following parameters: CV (constant volume) or VAV (variable air volume) operation; stand-alone unit with field-supplied sensors installed (CV or VAV); as a system via Carrier Comfort System (TEMP or VVT®); optional electronic expansion board installed (CV or VAV); linked to the Carrier Comfort Network; and availability of a computer and software (ComfortWorks™ Building Supervisor, and Service Tool) or LID-2B accessory installed to access the base control board. See Table 4.

NOTE: Access to the base control board allows unit occupancy schedules, unit timeclock, and various set points to be changed from their factory-defined default settings.

THERMISTORS — All units are equipped with a supply air thermistor (SAT) located in the supply fan discharge and an outdoor air thermistor (OAT) located in the outdoor air hood. Variable air volume units are supplied with a return air thermistor (RAT) located on the return air damper support.

CONSTANT VOLUME APPLICATIONS — The units, as shipped, are operable as stand-alone units, using either a standard (mechanical or electronic) 2-stage heat, 2-stage cool thermostat, or with an electronic room sensor and a timeclock to establish unit start and stop times.

With a standard thermostat (programmable is optional), heating and cooling operation is set by space temperature.

With a space sensor and timeclock, the machine will operate at default values unless they are changed using appropriate input devices. The space sensor senses space temperature and may be equipped with a timed override feature, which allows unit operation during unoccupied periods.

The space sensors may be used in multiples of 4 or 9 to achieve space temperature averaging. The use of a space sensor also allows the unit to be turned on and off from a remote signal.

Features with Thermostat Control of Unit

- two-stage heating
- two-stage cooling
- control of unit using Y1, Y2, W1, W2, and G thermostat inputs
- control of the indoor fan
- outdoor-air temperature/supply-air temperature monitoring
- control of an outdoor air condenser fan based on outdoor-air temperature
- control of modulating economizer damper to provide free cooling when outdoor conditions are suitable, using supply-air temperature as a control point
- control of the economizer damper and indoor fan to obtain unoccupied free cooling
- provide power exhaust output to an external power exhaust controller
- support a field test for field checkout
- control of 2 stages of CV power exhaust
- compressor Time Guard® (power up, minimum off and on times)
- compressor lockout during low supply-air temperature

Table 4 — Controls Options and Configurations (Non-Thermostat Applications)

UNIT CONFIGURATION	DEFAULT COOLING	DEFAULT HEATING
CV or VAV Unit with SPT Sensor	Unoccupied Cooling — 90 F (SPT) Occupied Cooling — NA	Unoccupied Heating — 55 F (SPT) Occupied Heating — NA
CV Unit with SPT Sensor and Remote Start/Stop Switch	Unoccupied Cooling — 90 F (SPT) Occupied Cooling — 78 F (SPT)	Unoccupied Heating — 55 F (SPT) Occupied Heating — 68 F (SPT)
VAV Unit Remote Start/Stop Switch Only	Unoccupied Cooling — 90 F (RAT) Occupied Cooling — 55 F (SAT)	Unoccupied Heating — 55 F (RAT) Occupied Heating — 68 F (RAT)*
VAV Unit with SPT Sensor and Remote Start/Stop Switch	Unoccupied Cooling — 90 F (SPT) Occupied Cooling — 55 F (SAT)	Unoccupied Heating — 55 F (SPT) Occupied Heating — 68 F (RAT)*

LEGEND

CV — Constant Volume
NA — Not Available
RAT — Return-Air Temperature
SAT — Supply-Air Temperature
SPT — Space Temperature
VAV — Variable Air Volume

*With DIP Switch No. 5 configured to OPEN (Occupied Heat Enabled).

NOTE: Space temperature sensor and remote start/stop switch are field-supplied.

Additional features are provided by accessing the standard unit control board via software with a computer. These features are:
- electronic expansion board features (if installed)
- control board diagnostics
- ability to change supply air set point (economizer control)
- ability to change high outdoor temperature lockout set point (economizer control)
- ability to change power exhaust set points

NOTE: A CV unit without a thermostat requires a field-supplied sensor for operation.

Features with Sensor Control of Unit (Stand-Alone Applications — Unit control is limited to CV unoccupied default set points, 90 F for cooling, 55 F for heating. There are 2 sensor options available:
- T-55 sensor will monitor room temperature and provide unoccupied override capability (1 hour)
- T-56 sensor will monitor room temperature, provide unoccupied override capability (1 hour), and provide a temperature offset of 5° F.

Standard features are:
- support of remote occupied/unoccupied input to start and stop the unit
- cooling capacity control of 3 stages using economizer and 2 compressors to maintain space temperature to an occupied or unoccupied set point
- enable heating or cooling during unoccupied periods as required to maintain space temperature within the unoccupied set points
- adjustment of space temperature set points of ±5° F when using a T-56 sensor

Additional features with sensor control of unit (with computer access or LID-2B) are:
- 365 day timeclock with backup (supports minute, hour, day of week, date, month, and year)
- daylight savings time function
- occupancy control with 8 periods for unit operation
- holiday table containing up to 18 holiday schedules
- ability to initiate timed override from T-55 or T-56 sensors for a timed period of 1 to 4 hours
- ability to use multiple space temperature sensors to average the space temperature
- temperature compensated start to calculate early start times before occupancy
- access to the Display, Maintenance, Configuration, Service, and Set Point data tables through network software
- loadshed and demand limiting

When the unit is equipped with a field-supplied space temperature sensor and a remote contact closure (remote start/stop) on the base control board, the occupied default set points will monitor unit operation. The occupied default set points are 78 F cooling and 68 F heating (if heating is present). See Fig. 18 for remote start/stop wiring.

NOTE: For units with a field-supplied space temperature sesor which have not had the base unit control board accessed via software to set an occupancy schedule, the remote start/stop closure will allow the unit to operate in the preconfigured occupied default set points (based on return-air temperature) of 78 F cooling and 68 F heating. Without this feature, the unit will control to the unoccupied default set points of 90 F cooling and 55 F heating.

An electronic expansion board may be field-installed to provide the following features:
- control of modulating economizer damper to maintain indoor air quality (IAQ) when outdoor conditions are suitable

  NOTE: The IAQ sensor must be set for current output (4 to 20 mA), not voltage output. Ensure the jumper on the sensor is in the upper position. See Fig. 19.
- provide discrete inputs for fan status, filter status, field-applied status, and demand limit
- provide an output for the external alarm light indicator
- provide power exhaust fire outputs for direct control of modulated power exhaust stages during fire or smoke modes
- control of smoke control modes including evacuation, smoke purge, pressurization, and fire shutdown (modulating power exhaust required)

When the unit is connected to the CCN (Carrier Comfort Network), the following expansion board features can be utilized:
- perform Demand Limit functions based on CCN loadshed commands or the state of the discrete input
- alarm monitoring of all key parameters
- CCN protocol
- provides CCN IAQ participation

See Carrier TEMP or VVT® (Variable Volume and Temperature) literature for complete TEMP (single zone) or VVT (multi-zone) application information.

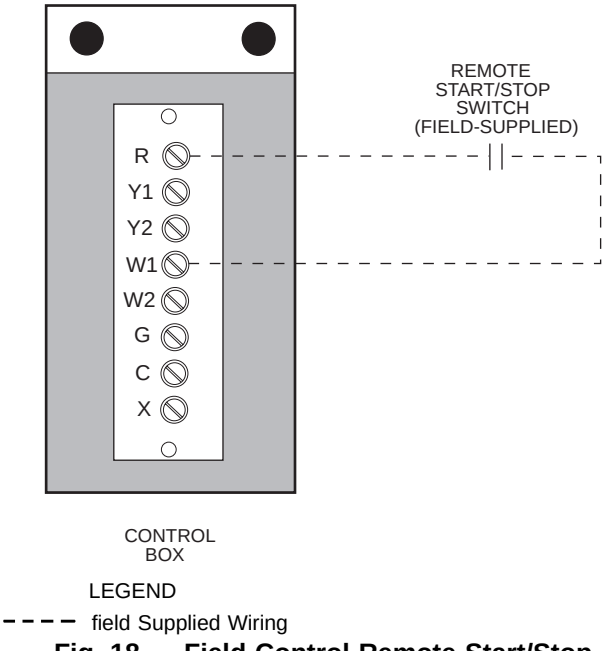


Fig. 18 — Field Control Remote Start/Stop

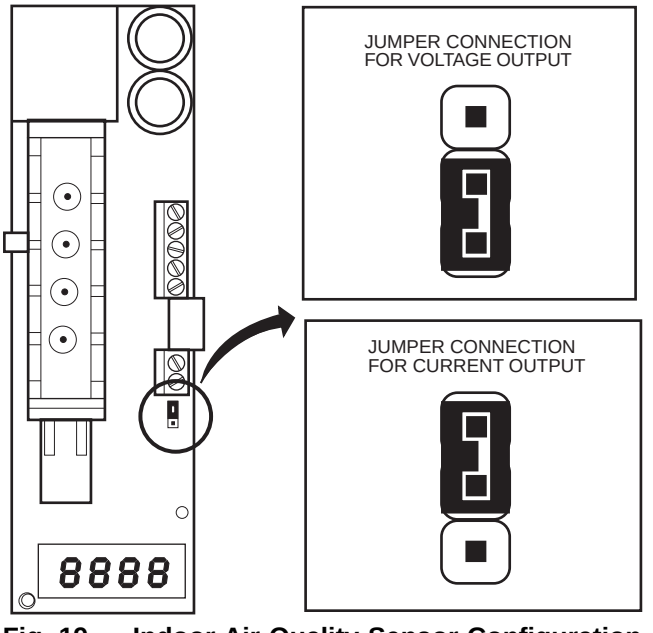


Fig. 19 — Indoor Air Quality Sensor Configuration

Features with Sensor Control of Unit (Network Applications) — The base control board provides, as standard, a connection for use with a Carrier VVT® system and can also be integrated into a Carrier Comfort Network.

When the unit is accessed via a PC equipped with ComfortWorks™, Building Supervisor, or Service Tool software, or accessory LID-2B, the following features can be accessed:
- on-board timeclock can be programmed
- occupancy schedules can be programmed
- unit set points can be changed
- alarms can be monitored

This access is available on the base control board via a RJ-11 phone jack or a 3-wire connection to the communication bus. See Fig. 20. The timeclock has a 10-hour minimum back-up time to provide for unit power off for servicing unit or during unexpected power outages. For complete Carrier Comfort System (CCS) or Carrier Comfort Network (CCN) features and benefits, refer to the product literature.

VARIABLE AIR VOLUME (VAV) APPLICATIONS

Features with Stand-Alone Applications — The units, as shipped, are operable as stand-alone units with the addition of a timeclock to establish unit start and stop times.

Heating and cooling in both on and off modes is controlled to default values by the base unit control. Set points may be changed with appropriate input devices.

The control has an on-board occupancy schedule which can be set using an input device and eliminates the need for an external timeclock.

During both the on and off periods, cooling operation is controlled to the supply air setting and heating is controlled to the return air setting (or to the optional space temperature sensor). During the on period, the supply fan runs continuously. During the off period, the supply fan will be activated if the return air sensor is outside of the set points and will run log enough to accurately sample the space temperature. The supply fan will then continue to run until any heating or cooling load is satisfied, at which point it will turn off.

The use of a space sensor will allow for supply air reset to conserve energy and maintain comfort. If equipped with an override feature, the sensor will allow operation during the off period for a fixed length of time.

Base unit control supports a Heat Interlock Relay (field supplied) to fully open the VAV terminal devices during heating operation.

Standard features of a VAV unit with a remote start/stop switch are:
- control board diagnostics
- control of an outdoor condenser fan based upon outdoor air temperature
- control of modulating economizer to provide free cooling when outdoor conditions are suitable, using supply-air temperature as a set point
- support of remote occupied/unoccupied input to start or stop the unit
- provide power exhaust output to an external power exhaust controller
- support supply-air temperature reset to offset supply air set point
- support a field test for field check out
- support linkage to DAV (digital air volume) systems
- cooling capacity control of up to 6 stages plus economizer with compressors and unloaders to maintain supply air temperature set point during occupied periods
- control of one stage of heat to maintain return-air temperature at heating set point during occupied periods
- provide a variable frequency drive high voltage relay output to enable VFD
- control of heat interlock relay
- compressor Time Guard® override (power up, minimum off and on times)

With the addition of a remote start/stop switch heating or cooling is enabled during unoccupied periods as required to maintain space temperature to within unoccupied set points.

Occupied heating is enabled or disabled by the position of DIP (dual in-line package) switch no. 5.

Additional features may be provided with Electronic Access to Unit Control Board. These features are:
- additional control board diagnostics
- compressor lockout during low supply-air temperature
- electronic expansion board features (if installed)
- control of the economizer damper and indoor fan to obtain unoccupied free cooling
- 365-day timeclock with backup (supports minute, hour, day, month, and year)
- holiday table containing up to 18 holiday schedules
- occupancy control with 8 periods for unit operation
- support a set of display, maintenance, configuration, service, and set point data tables for interface with Building Supervisor, ComfortWorks, or Service Tool software software or accessory LID-2B

When a VAV unit with a space temperature sensor is accessed via a computer, the following additional features are available:
- ability to initiate timed override from T-55 sensors
- temperature compensated start to calculate early start time before occupancy
- provide space temperature reset to reset the supply air set point upward when the temperature falls below the occupied cooling set point

An electronic expansion board may be field-installed to provide the following features:
- fan status
- filter status
- field-applied status
- demand limiting
- IAQ (indoor air quality) Sensor
- OAQ (outdoor air quality) Sensor
- alarm light
- fire unit shutdown
- fire pressurization
- fire evacuation
- fire smoke purge

When the unit is connected to the CCN (Carrier Comfort Network), the following expansion board features can be utilized:
- CCN IAQ participation
- CCN OAQ participation
- CCN demand limit participation
- modulated power exhaust override
- ability to use multiple space temperature sensors (multiples of 4 and 9 only) to average space temperature (DAV only)

A field-supplied T-55 space temperature sensor can be added to monitor room temperature and provide unoccupied override capability (1 hour).

When the unit is equipped with a field-supplied space temperature sensor and a remote contact closure (remote start/stop) the occupied default set points will monitor unit operation. The occupied default set points are 55 F (supply air) cooling and 68 F (return air temperature) heating. See Fig. 18 for remote start/stop wiring.

NOTE: For units without a space temperature sensor and which have not had the base unit control board accessed via software to set an occupancy schedule, the remote start/stop closure will allow the unit to operate in the pre-configured occupied default set points of 55 F (supply-air temperature)

cooling and 68 F (return-air temperature) heating. Without an occupancy schedule, the unit will control to the unoccupied default set points of 90 F (return air) cooling and 55 F (return air) heating.

Features with Network Applications — The base control board provides, as standard, a connection for use with a Carrier Comfort System and can also be integrated into a Carrier Comfort Network (CCN). When the unit is accessed via a PC equipped with ComfortWorks™, Building Supervisor, or Service Tool software or LID-2B accessory, the following features can be accessed:

- on-board timeclock can be programmed
- occupancy schedules can be programmed
- unit set points can be changed
- alarms can be monitored

This access is available on the base control board via a RJ-11 phone jack or a 3-wire connection to the communication bus. See Fig. 20. The internal timeclock has a 10-hour minimum back-up time to provide for unit power off for servicing unit or during unexpected power outages. For complete Carrier Comfort System (CCS) or Carrier Comfort Network (CCN) features and benefits, refer to the product literature.

Step 9 — Make Electrical Connections

POWER WIRING — Units are factory wired for the voltage shown on the unit nameplate.

When installing units, provide a disconnect per NEC (National Electrical Code) of adequate size (MOCP [maximum overcurrent protection] of unit is on the informative plate). All field wiring must comply with NEC and all local codes. Size wire based on MCA (minimum circuit amps) on the unit informative plate. See Fig. 21 for power wiring connections to the unit power terminal block and equipment ground.

The main power terminal block is suitable for use with aluminum or copper wire. See Fig. 21. Units have circuit breakers for compressors, fan motors, and control circuit. If required by local codes, provide an additional disconnect switch. Whenever external electrical sources are used, unit must be electrically grounded in accordance with local codes, or in absence of local codes, with NEC, ANSI C1-latest year.

All field wiring must comply with NEC and local code requirements.

FIELD POWER SUPPLY — Unit is factory wired for voltage shown on unit nameplate. See Table 5 for electrical data.

Field wiring can be brought into the unit from bottom (through basepan and roof curb) or through side of unit (corner post next to control box).

A 3½-in. NPT coupling for field power wiring and a ¾-in. NPT coupling for 24-v control wiring are provided in basepan. In the side post, there are two 2½-in. (024-034) or 3-in. (038-068) knockouts for the field power wiring. See Fig. 5-10. If control wiring is to be brought in through the side of unit, a ⅞-in. diameter hole is provided in the condenser side post next to the control box.

If disconnect box is mounted to corner post, be careful not to drill any screws into the condenser coil.

Routing Through Bottom of Unit — If wiring is brought in through bottom of unit, use field-supplied watertight conduit to run power wiring from basepan out through bottom 3½-in. hole to the disconnect box and back into unit to the main control box.

Use strain relief going into control box through 2½-in. diameter hole provided. After wires are in unit control box, connect to power terminal block (see Power Wiring section above).

Low-voltage wiring must be run in watertight conduit from the basepan to control box and through ⅞-in. diameter hole provided in bottom of unit control box. Field-supplied strain relief must be used going into the box. After wiring is in control box, make connections to proper terminals on terminal blocks (see Field Control Wiring section on page 21).

Install conduit connector in unit basepan as shown in Fig. 5-10. Route power and ground lines through connector to terminal connections in unit control box as shown on unit wiring diagram and Fig. 21.

Routing Through Side of Unit — Route power wiring in field-supplied watertight conduit into unit through 2½-in. or 3-in. hole. See Fig. 21.

Use field-supplied strain relief going into control box through 2½-in. or 3-in. diameter hole provided. After wires are in unit control box, connect to power terminal block (see Power Wiring section on this page).

Bring low-voltage control wiring through factory-drilled ⅞-in. diameter hole in condenser side post. Use strain relief going into ⅞-in. diameter hole in bottom of unit control box.

After wiring is in control box, make connection to proper terminals on terminal blocks (see Field Control Wiring section below).

IMPORTANT: The VAV (variable air volume) units use variable frequency drives, which generate, use and can radiate radio frequency energy. If units are not installed and used in accordance with these instructions, they may cause radio interference. They have been tested and found to comply with limits of a Class A computing device as defined by FCC (Federal Communications Commission) regulations, Subpart J of Part 15, which are designed to provide reasonable protection against such interference when operated in a commercial environment.

⚠ WARNING

The unit must be electrically grounded in accordance with local codes and NEC ANSI/NFPA 70 (National Fire Protection Association).

Affix crankcase heater sticker (located in the installers packet) to unit disconnect switch.

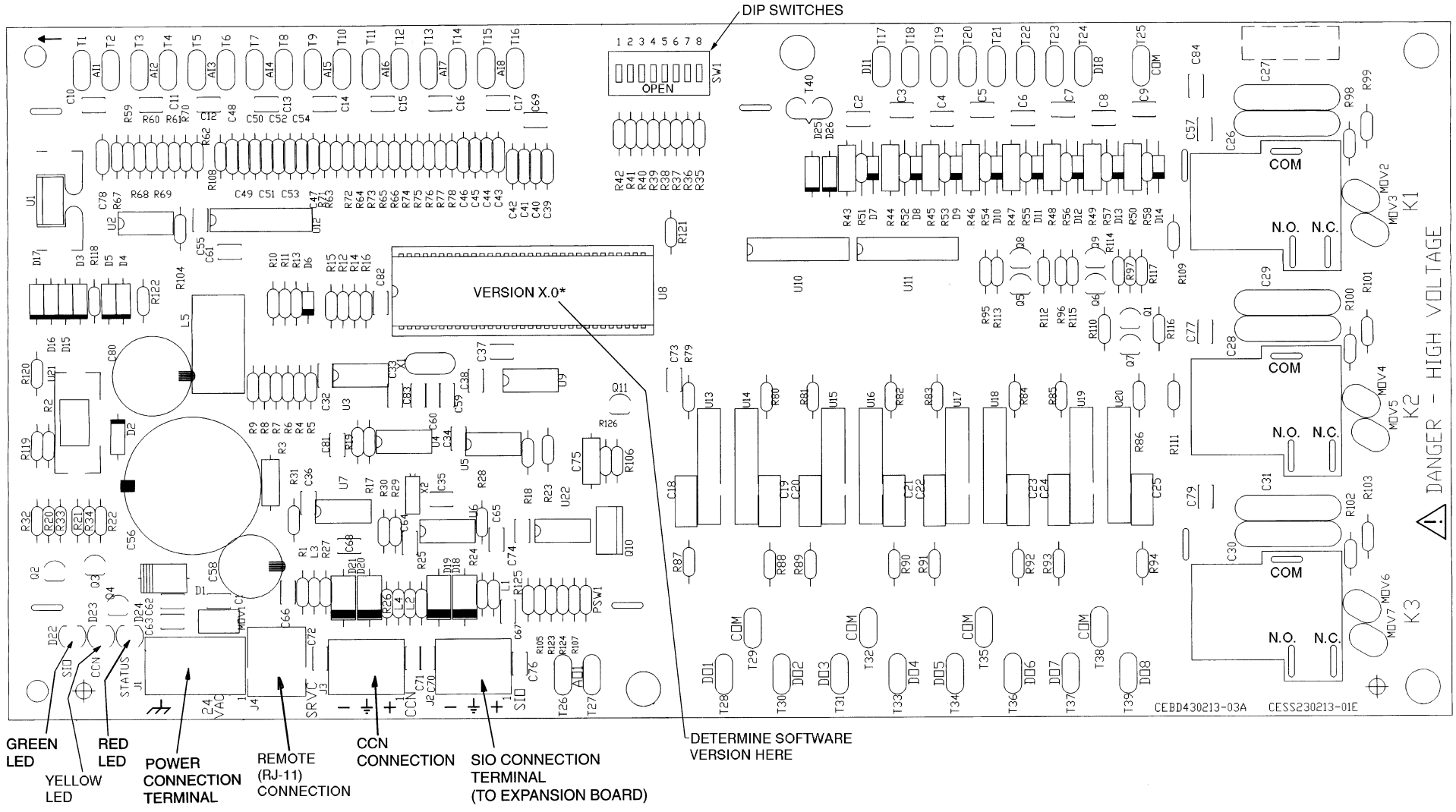
Voltage to compressor terminals during compressor operation must be within the voltage range indicated on the unit nameplate. On 3-phase units, phases must be balanced within 2%. Contact local power company for correction of improper voltage or phase imbalance. Unit failure due to operation of unit on improper line voltage or with excessive phase imbalance constitutes abuse and may cause damage to unit electrical components.

On 208/230-v units, transformer no. 1 is wired for 230-v. If 208/230-v unit is to be run with 208-v power supply, the transformer must be rewired as follows:

1. Remove cap from red (208 v) wire.
2. Remove cap from spliced orange (230 v) wire. Disconnect orange wire from black unit power wire.
3. Cap orange wire.
4. Splice red wire and black unit power wire. Cap wires.

IMPORTANT: BE CERTAIN UNUSED WIRES ARE CAPPED. Failure to do so may damage the transformers.

FIELD CONTROL WIRING — The unit can use either a Carrier-approved thermostat or a CCN (Carrier Comfort Network) compatible temperature sensor. Thermostats are used on CV (constant volume) units only. Control box diagrams are shown in Fig. 22-24.



LEGEND

CCN	— Carrier Comfort Network	**N.O.**	— Normally Open
COM	— Common	**R**	— Relay
D	— Diode	**SIO**	— Serial Input/Output
DIP	— Dual In-Line Package	**SW**	— Switch
LED	— Light-Emitting Diode	**T**	— Terminal
N.C.	— Normally Closed		

*Where X is the unit control software version number.

Fig. 20 — Control Board Diagram

Table 5 — Electrical Data

UNIT SIZE 48EJ,EK, EW,EY	NOMNAL VOLTAGE (3 Ph, 60 Hz)	VOLTAGE RANGE		COMPRESSOR				OFM			IFM		POWER EXHAUST		COMBUSTION FAN MOTOR	POWER SUPPLY	
				No. 1		No. 2											
		Min	Max	RLA	LRA	RLA	LRA	Qty	Hp	FLA (ea)	Hp	FLA	FLA	LRA	FLA	MCA	MOCP*
024	208/230	187	254	39.1	228	25.6	160	2	1	5.3	5	16.7/15.2	—	—	0.96	101.8/100.3	125/125
													23.6	41.6	0.96	125.4/123.9	150/150
											10	30.8/28.0	—	—	0.96	115.9/113.1	150/150
													23.6	41.6	0.96	139.5/136.7	175/175
											15	46.2/42.0	—	—	0.96	131.3/127.1	150/150
													23.6	41.6	0.96	154.9/150.7	175/175
	460	414	508	19.9	114	11.5	80	2	1	2.7	5	7.6	—	—	0.5	49.4	60
													12.6	23.6	0.5	62.0	80
											10	14.0	—	—	0.5	55.8	70
													12.6	23.6	0.5	68.4	80
											15	21.0	—	—	0.5	62.8	80
													12.6	23.6	0.5	75.4	90
	575	518	632	16.0	91	9.6	64	2	1	2.4	5	6.1	—	—	0.5	40.5	50
													12.6	23.6	0.5	53.1	60
											10	11.0	—	—	0.5	45.4	60
													12.6	23.6	0.5	58.0	70
											15	17.0	—	—	0.5	51.4	60
													12.6	23.6	0.5	64.0	80
028	208/230	187	254	39.1	228	39.1	228	2	1	5.3	7.5	24.2/22.0	—	—	0.96	122.8/120.6	150/150
													23.6	41.6	0.96	146.4/144.2	175/175
											10	30.8/28.0	—	—	0.96	129.4/126.6	150/150
													23.6	41.6	0.96	153.0/150.2	175/175
											15	46.2/42.0	—	—	0.96	144.8/140.6	175/175
													23.6	41.6	0.96	168.4/164.2	200/200
	460	414	508	19.9	114	19.9	114	2	1	2.7	7.5	11.0	—	—	0.5	61.2	80
													12.6	23.6	0.5	73.8	90
											10	14.0	—	—	0.5	64.2	80
													12.6	23.6	0.5	76.8	90
											15	21.0	—	—	0.5	71.2	90
													12.6	23.6	0.5	83.8	100
	575	518	632	16.0	91	16.0	91	2	1	2.4	7.5	9.0	—	—	0.5	49.8	60
													12.6	23.6	0.5	62.4	70
											10	11.0	—	—	0.5	51.8	60
													12.6	23.6	0.5	64.4	80
											15	17.0	—	—	0.5	57.8	70
													12.6	23.6	0.5	70.4	80
030	208/230	187	254	57.1	266	39.1	228	2	1	5.3	10	30.8/28.0	—	—	0.96	151.9/149.1	200/200
													23.6	41.6	0.96	175.5/172.7	225/225
											15	46.2/42.0	—	—	0.96	167.3/163.1	225/225
													23.6	41.6	0.96	190.9/186.7	225/225
											20	59.4/54.0	—	—	0.96	180.5/175.1	225/225
													23.6	41.6	0.96	204.1/198.7	250/250
	460	414	508	25.6	120	19.9	114	2	1	2.7	10	14.0	—	—	0.5	71.3	90
													12.6	23.6	0.5	83.9	100
											15	21.0	—	—	0.5	78.3	100
													12.6	23.6	0.5	90.9	110
											20	27.0	—	—	0.5	84.3	100
													12.6	23.6	0.5	96.9	110
	575	518	632	20.5	96	16.0	91	2	1	2.4	10	11.0	—	—	0.5	57.4	70
													12.6	23.6	0.5	70.0	90
											15	17.0	—	—	0.5	63.4	80
													12.6	23.6	0.5	76.0	90
											20	22.0	—	—	0.5	68.4	80
													12.6	23.6	0.5	81.0	100

See Legend and Notes on page 28.

Table 5 — Electrical Data (cont)

UNIT SIZE 48EJ,EK, EW,EY	NOMINAL VOLTAGE (3 Ph, 60 Hz)	VOLTAGE RANGE		COMPRESSOR				OFM			IFM		POWER EXHAUST		COMBUSTION FAN MOTOR	POWER SUPPLY	
				No. 1		No. 2											
		Min	Max	RLA	LRA	RLA	LRA	Qty	Hp	FLA (ea)	Hp	FLA	FLA	LRA	FLA	MCA	MOCP*
034	208/230	187	254	57.1	266	57.1	266	2	1	5.3	10	30.8/28.0	—	—	0.96	169.9/167.1	225/200
													23.6	41.6	0.96	193.5/190.7	250/225
											15	46.2/42.0	—	—	0.96	185.3/181.1	200/200
													23.6	41.6	0.96	208.9/204.7	250/250
											20	59.4/54.0	—	—	0.96	198.5/193.1	250/250
													23.6	41.6	0.96	222.1/216.7	275/250
	460	414	508	25.6	120	25.6	120	2	1	2.7	10	14.0	—	—	0.5	77.0	100
													12.6	23.6	0.5	89.6	110
											15	21.0	—	—	0.5	84.0	100
													12.6	23.6	0.5	96.6	110
											20	27.0	—	—	0.5	90.0	110
													12.6	23.6	0.5	102.6	125
	575	518	632	20.5	96	20.5	96	2	1	2.4	10	11.0	—	—	0.5	61.9	80
													12.6	23.6	0.5	74.5	90
											15	17.0	—	—	0.5	67.9	80
													12.6	23.6	0.5	80.5	100
											20	22.0	—	—	0.5	72.9	90
													12.6	23.6	0.5	85.5	100
038	208/230	187	254	57.1	266	57.1	266	4	1	5.3	10	30.8/28.0	—	—	0.96	180.5/177.7	225/225
													23.6	41.6	0.96	204.1/201.3	250/250
											15	46.2/42.0	—	—	0.96	195.9/191.7	250/225
													23.6	41.6	0.96	219.5/215.3	275/250
											20	59.4/54.0	—	—	0.96	209.1/203.7	250/250
													23.6	41.6	0.96	232.7/227.3	275/275
	460	414	508	25.6	120	25.6	120	4	1	2.7	10	14.0	—	—	0.5	82.4	100
													12.6	23.6	0.5	95.0	110
											15	21.0	—	—	0.5	89.4	110
													12.6	23.6	0.5	102.0	125
											20	27.0	—	—	0.5	95.4	110
													12.6	23.6	0.5	108.0	125
	575	518	632	20.5	96	20.5	96	4	1	2.4	10	11.0	—	—	0.5	66.7	80
													12.6	23.6	0.5	79.3	90
											15	17.0	—	—	0.5	72.7	90
													12.6	23.6	0.5	85.3	100
											20	22.0	—	—	0.5	77.7	90
													12.6	23.6	0.5	90.3	110
044	208/230	187	254	69.2	345	69.2	345	4	1	5.3	15	46.2/42.0	—	—	0.96	223.1/218.9	275/275
													23.6	41.6	0.96	246.7/242.5	300/300
											20	59.4/54.0	—	—	0.96	236.3/230.9	300/300
													23.6	41.6	0.96	259.9/254.5	300/300
											25	74.8/68.0	—	—	0.96	251.7/244.9	300/300
													23.6	41.6	0.96	275.3/268.5	300/300
	460	414	508	28.8	173	28.8	173	4	1	2.7	15	21.0	—	—	0.5	96.6	125
													12.6	23.6	0.5	109.2	125
											20	27.0	—	—	0.5	102.6	125
													12.6	23.6	0.5	115.2	125
											25	34.0	—	—	0.5	109.6	125
													12.6	23.6	0.5	122.2	150
	575	518	632	26.7	120	26.7	120	4	1	2.4	15	17.0	—	—	0.5	86.7	110
													12.6	23.6	0.5	99.3	125
											20	22.0	—	—	0.5	91.7	110
													12.6	23.6	0.5	104.3	125
											25	27.0	—	—	0.5	96.7	110
													12.6	23.6	0.5	109.3	125

See Legend and Notes on page 28.

Table 5 — Electrical Data (cont)

UNIT SIZE 48EJ,EK, EW,EY	NOMINAL VOLTAGE (3 Ph, 60 Hz)	VOLTAGE RANGE		COMPRESSOR				OFM			IFM		POWER EXHAUST		COMBUSTION FAN MOTOR	POWER SUPPLY	
				No. 1		No. 2											
		Min	Max	RLA	LRA	RLA	LRA	Qty	Hp	FLA (ea)	Hp	FLA	FLA	LRA	FLA	MCA	MOCP*
048	208/230	187	254	82.1	446	69.2	345	4	1	5.3	20	59.4/54.0	—	—	0.96	252.4/247.0	300/300
													23.6	41.6	0.96	276.0/270.6	300/300
											25	74.8/68.0	—	—	0.96	267.8/261.0	300/300
													23.6	41.6	0.96	291.4/284.6	300/300
											30	88.0/80.0	—	—	0.96	281.0/273.0	300/300
													23.6	41.6	0.96	304.6/296.6	350/300
	460	414	508	42.3	223	28.8	173	4	1	2.7	20	27.0	—	—	0.5	119.5	150
													12.6	23.6	0.5	132.1	150
											25	34.0	—	—	0.5	126.5	150
													12.6	23.6	0.5	139.1	175
											30	40.0	—	—	0.5	132.5	150
													12.6	23.6	0.5	145.1	175
	575	518	632	34.6	164	26.7	120	4	1	2.4	20	22.0	—	—	0.5	101.6	125
													12.6	23.6	0.5	114.2	125
											25	27.0	—	—	0.5	106.6	125
													12.6	23.6	0.5	119.2	150
											30	32.0	—	—	0.5	111.6	125
													12.6	23.6	0.5	124.2	150
054	208/230	187	254	82.1	446	69.2	345	4	1	5.3	15	46.2/42.0	—	—	1.44	239.2/235.0	300/300
													35.4	62.4	1.44	274.6/270.4	350/350
											20	59.4/54.0	—	—	1.44	252.4/247.0	300/300
													35.4	62.4	1.44	287.8/282.4	350/350
											25	74.8/68.0	—	—	1.44	267.8/261.0	300/300
													35.4	62.4	1.44	303.2/296.4	350/350
	460	414	508	43.6	223	30.8	173	4	1	2.7	15	21.0	—	—	0.75	117.1	150
													18.9	35.4	0.75	136.0	175
											20	27.0	—	—	0.75	123.1	150
													18.9	35.4	0.75	142.0	175
											25	34.0	—	—	0.75	130.1	150
													18.9	35.4	0.75	149.0	175
	575	518	632	34.6	164	26.9	120	4	1	2.4	15	17.0	—	—	0.75	96.8	125
													18.9	35.4	0.75	115.7	150
											20	22.0	—	—	0.75	101.8	125
													18.9	35.4	0.75	120.7	150
											25	27.0	—	—	0.75	106.8	125
													18.9	35.4	0.75	125.7	150
058	208/230	187	254	106.4	506	69.2	345	6	1	5.3	20	59.4/54.0	—	—	1.44	293.4/288.0	350/350
													35.4	62.4	1.44	328.8/323.4	400/400
											25	74.6/68.0	—	—	1.44	308.6/302.0	400/400
													35.4	62.4	1.44	344.0/337.4	450/400
											30	88.0/80.0	—	—	1.44	322.0/314.0	400/400
													35.4	62.4	1.44	357.4/349.4	450/450
	460	414	508	52.6	253	30.8	173	6	1	2.7	20	27.0	—	—	0.75	139.7	175
													18.9	35.4	0.75	158.6	200
											25	34.0	—	—	0.75	146.7	175
													18.9	35.4	0.75	165.6	200
											30	40.0	—	—	0.75	152.7	200
													18.9	35.4	0.75	171.6	200
	575	518	632	40.4	176	26.9	120	6	1	2.4	20	22	—	—	0.75	113.8	150
													18.9	35.4	0.75	132.7	150
											25	27	—	—	0.75	118.8	150
													18.9	35.4	0.75	137.7	175
											30	32	—	—	0.75	123.8	150
													18.9	35.4	0.75	142.7	175

See Legend and Notes on page 28.

Table 5 — Electrical Data (cont)

UNIT 48EJ,EK, EW,EY	NOMINAL VOLTAGE (3 Ph, 60 Hz)	VOLTAGE RANGE		COMPRESSOR No. 1		COMPRESSOR No. 2		OFM			IFM		POWER EXHAUST		COMBUSTION FAN MOTOR	POWER SUPPLY	
		Min	Max	RLA	LRA	RLA	LRA	Qty	Hp	FLA (ea)	Hp	FLA	FLA	LRA	FLA	MCA	MOCP*
064	208/230	187	254	106.4	506	82.1	446	6	1	5.3	25	74.6/ 68.0	—	—	1.44	321.5/314.9	400/400
													35.4	62.4	1.44	356.9/350.3	450/450
											30	88.0/ 80.0	—	—	1.44	334.9/326.9	400/400
													35.4	62.4	1.44	370.3/362.3	450/450
											40	114.0/104.0	—	—	1.44	360.9/350.9	450/450
													35.4	62.4	1.44	396.3/386.3	500/450
	460	414	508	52.6	253	43.6	223	6	1	2.7	25	34.0	—	—	0.75	159.5	200
													18.9	35.4	0.75	178.4	225
											30	40.0	—	—	0.75	165.5	200
													18.9	35.4	0.75	184.4	225
											40	52.0	—	—	0.75	177.5	225
													18.9	35.4	0.75	196.4	225
	575	518	632	40.4	176	34.6	164	6	1	2.4	25	27.0	—	—	0.75	126.5	150
													18.9	35.4	0.75	145.4	175
											30	32.0	—	—	0.75	131.5	150
													18.9	35.4	0.75	150.4	175
											40	41.0	—	—	0.75	140.5	175
													18.9	35.4	0.75	159.4	175
068	208/230	187	254	106.4	506	106.4	506	6	1	5.3	25	74.6/ 68.0	—	—	1.44	345.8/339.2	450/400
													35.4	62.4	1.44	381.2/374.6	450/450
											30	88.0/ 80.0	—	—	1.44	359.2/351.2	450/450
													35.4	62.4	1.44	394.6/386.6	500/450
											40	114.0/104.0	—	—	1.44	385.2/375.2	450/450
													35.4	62.4	1.44	420.6/410.6	500/500
	460	414	508	52.6	253	52.6	253	6	1	2.7	25	34.0	—	—	0.75	168.5	200
													18.9	35.4	0.75	187.4	225
											30	40.0	—	—	0.75	174.5	225
													18.9	35.4	0.75	193.4	225
											40	52.0	—	—	0.75	186.5	225
													18.9	35.4	0.75	205.4	250
	575	518	632	40.4	176	40.4	176	6	1	2.4	25	27	—	—	0.75	132.3	150
													18.9	35.4	0.75	151.2	175
											30	32	—	—	0.75	137.3	175
													18.9	35.4	0.75	156.2	175
											40	41	—	—	0.75	146.3	175
													18.9	35.4	0.75	165.2	200

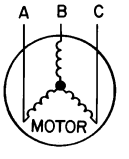
LEGEND

FLA — Full Load Amps
HACR — Heating, Air Conditioning and Refrigeration
IFM — Indoor (Evaporator) Fan Motor
LRA — Locked Rotor Amps
MCA — Minimum Circuit Amps
MOCP — Maximum Overcurrent Protection
NEC — National Electrical Code
OFM — Outdoor (Condenser) Fan Motor
RLA — Rated Load Amps

*Fuse or HACR circuit breaker.

NOTES:
1. In compliance with NEC requirements for multimotor and combination load equipment (refer to NEC Articles 430 and 440), the overcurrent protective device for the unit shall be fuse or HACR breaker. The Canadian units may be fuse or circuit breaker.
2. **Unbalanced 3-Phase Supply Voltage**
   Never operate a motor where a phase imbalance in supply voltage is greater than 2%. Use the following formula to determine the percent of voltage imbalance.
   % Voltage Imbalance
   $= 100 \times \frac{\text{max voltage deviation from average voltage}}{\text{average voltage}}$

EXAMPLE: Supply voltage is 460-3-60.



AB = 452 v
BC = 464 v
AC = 455 v

Average Voltage $= \frac{452 + 464 + 455}{3}$

$= \frac{1371}{3}$

$= 457$

Determine maximum deviation from average voltage.
(AB) 457 − 452 = 5 v
(BC) 464 − 457 = 7 v
(AC) 457 − 455 = 2 v

Maximum deviation is 7 v.

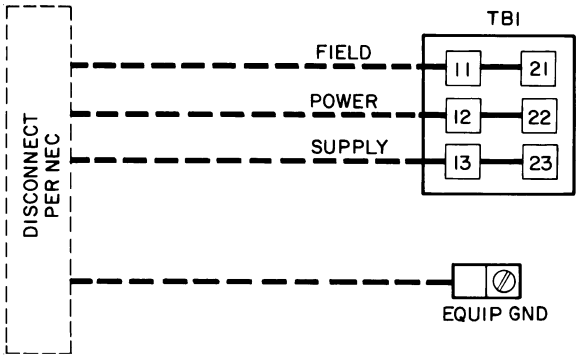
Determine percent of voltage imbalance.
% Voltage Imbalance

$= 100 \times \frac{7}{457}$

$= 1.53\%$

This amount of phase imbalance is satisfactory as it is below the maximum allowable 2%.

IMPORTANT: If the supply voltage phase imbalance is more than 2%, contact your local electric utility company immediately.

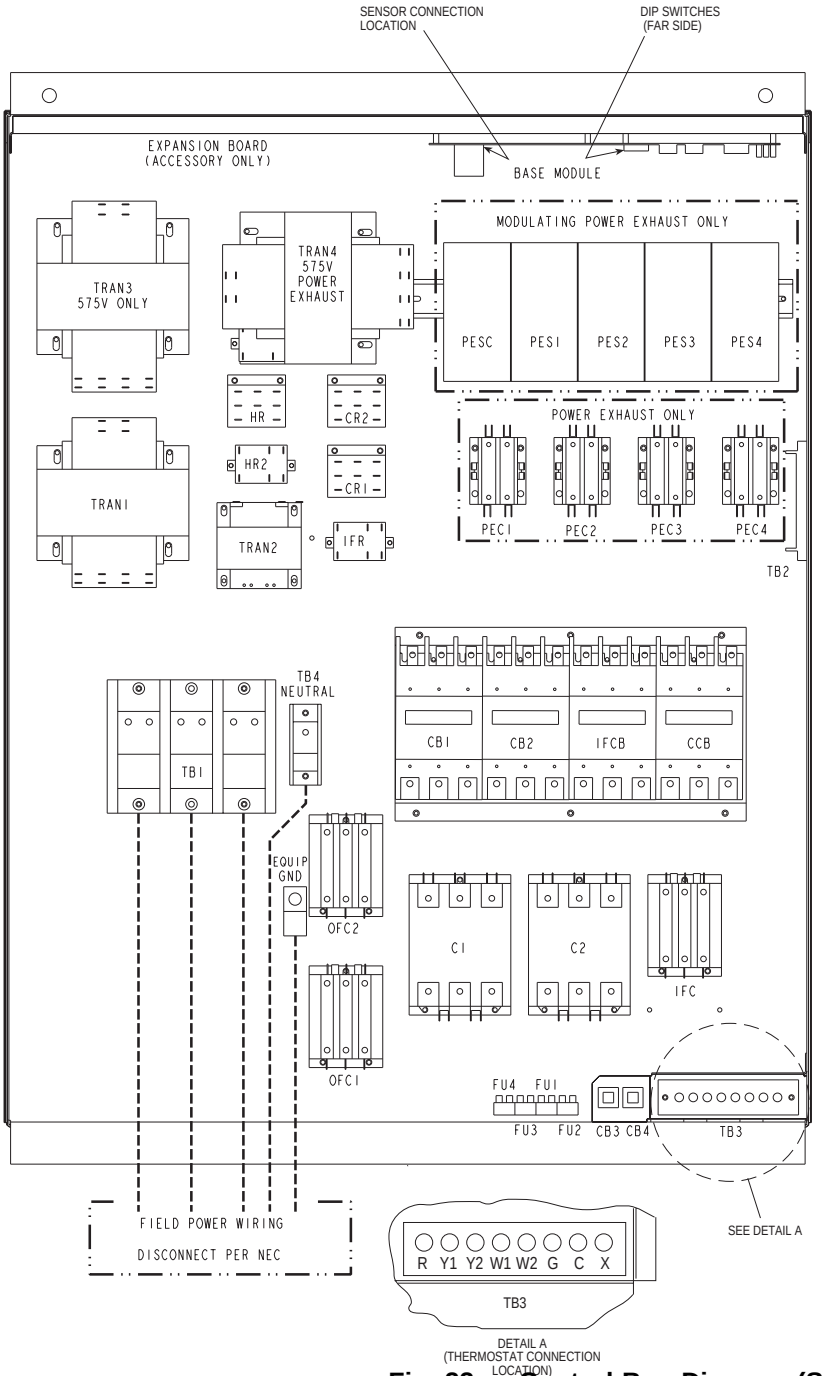


LEGEND

GND — Ground
NEC — National Electrical Code
TB — Terminal Block

NOTE: Maximum wire size for TB1 is 500 MCM.

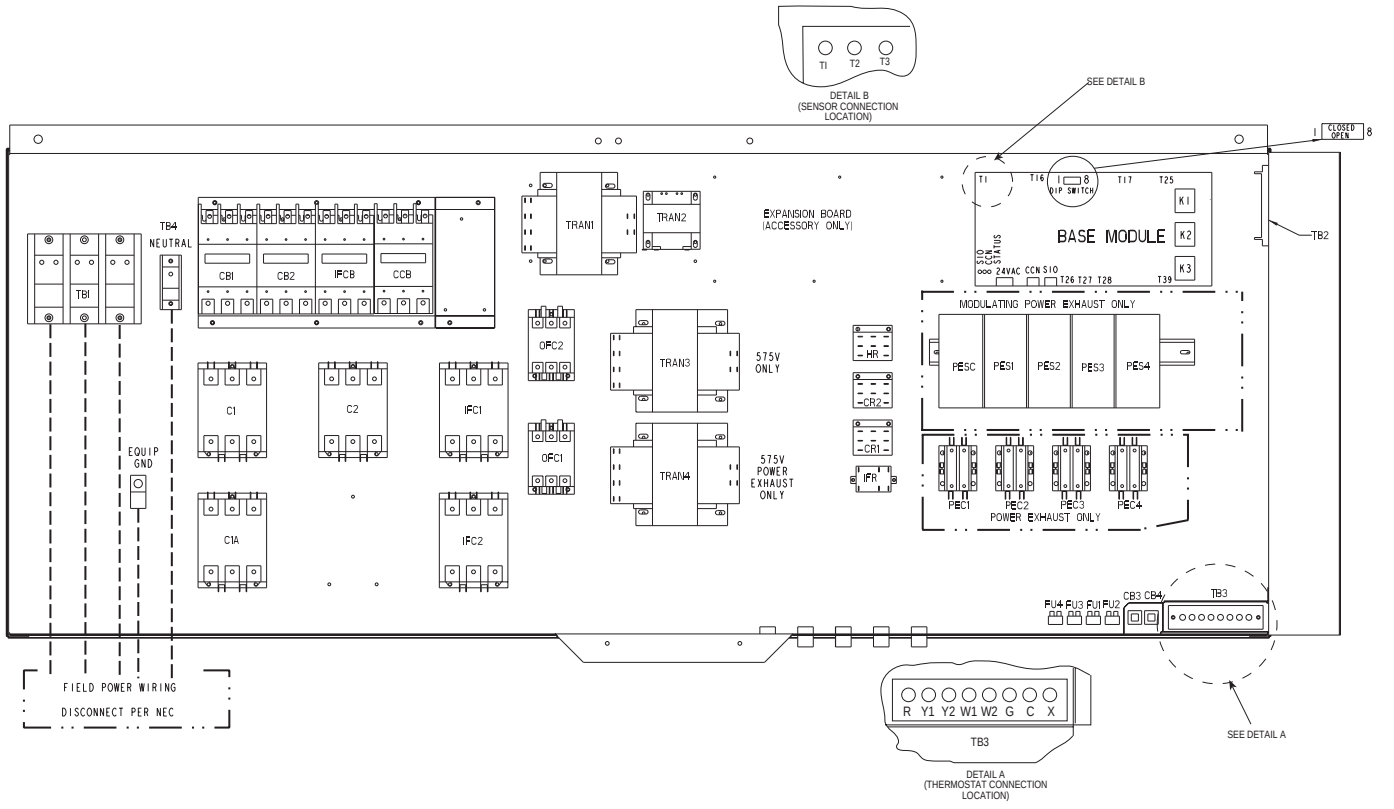
Fig. 21 — Field Power Wiring Connections



LEGEND

C — Compressor/Contactor
CB — Circuit Breaker
CCB — Control Circuit Breaker
CR — Control Relay
DIP — Dual In-Line Package
EQUIP — Equipment
FU — Fuse
GND — Ground
HR — Heater Relay
IFC — Indoor-Fan Contactor
IFCB — Indoor-Fan Circuit Breaker
IFR — Indoor Fan Relay
OFC — Outdoor-Fan Contactor
PEC — Power Exhaust Controller
PES — Power Exhaust Sequencer
PESC — Power Exhaust Sequencer Controller
TB — Terminal Block
TRAN — Transformer

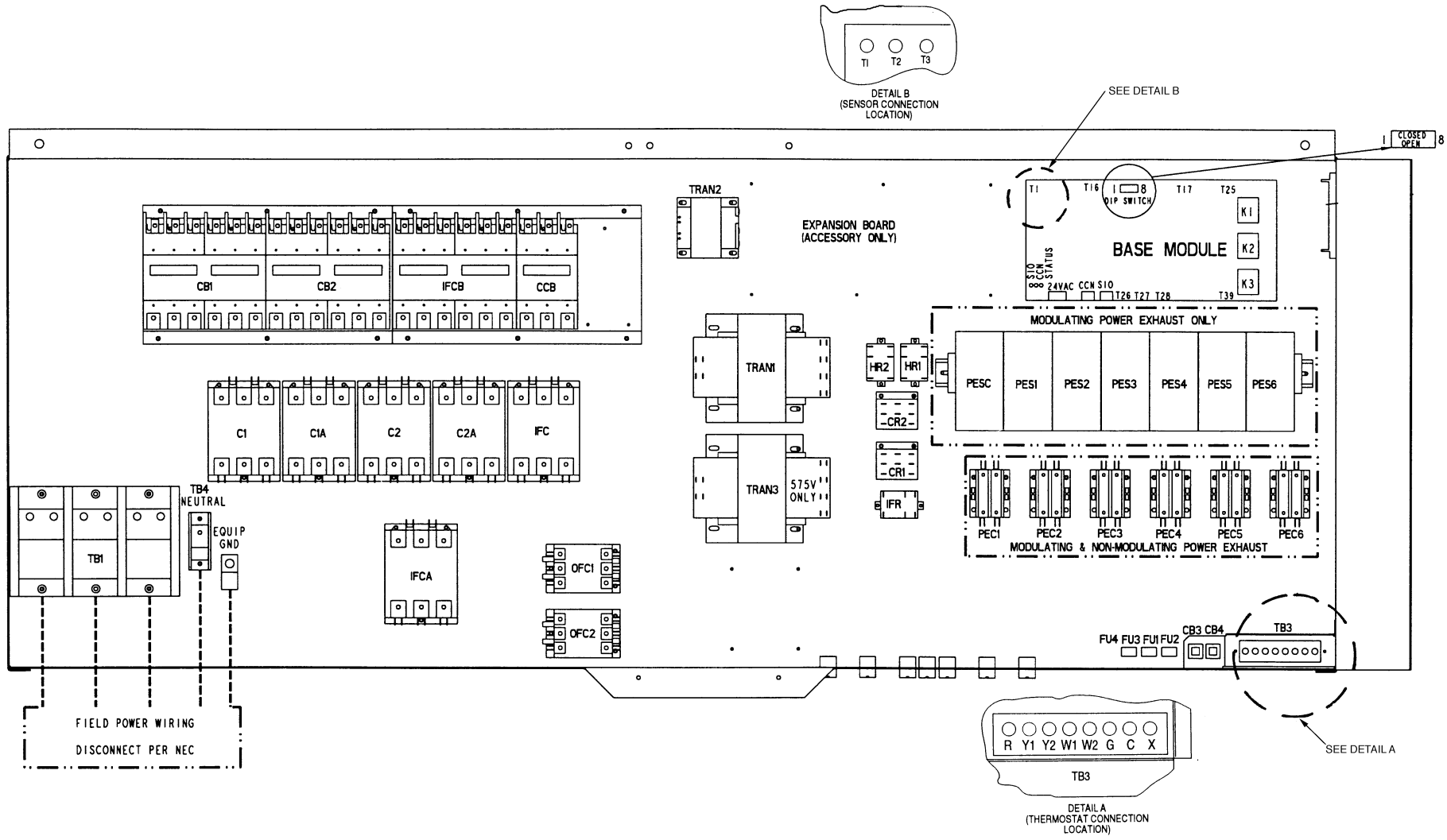
Fig. 22 — Control Box Diagram (Sizes 024-034)



LEGEND

C	—	Compressor/Contactor	**FU**	—	Fuse	**PEC**	—	Power Exhaust Controller
CB	—	Circuit Breaker	**GND**	—	Ground	**PES**	—	Power Exhaust Sequencer
CCB	—	Control Circuit Breaker	**HR**	—	Heater Relay	**PESC**	—	Power Exhaust Sequencer Controller
CCN	—	Carrier Comfort Network	**IFC**	—	Indoor-Fan Contactor	**SIO**	—	Serial Input/Output
CR	—	Control Relay	**IFCB**	—	Indoor-Fan Circuit Breaker	**TB**	—	Terminal Block
DIP	—	Dual In-Line Package	**IFR**	—	Indoor Fan Relay	**TRAN**	—	Transformer
EQUIP	—	Equipment	**OFC**	—	Outdoor-Fan Contactor			

Fig. 23 — Control Box Diagram (Sizes 038-048)



LEGEND

C	— Compressor/Contactor	**IFC**	— Indoor-Fan Contactor
CB	— Circuit Breaker	**IFCB**	— Indoor-Fan Circuit Breaker
CCB	— Control Circuit Breaker	**IFR**	— Indoor Fan Relay
CCN	— Carrier Comfort Network	**OFC**	— Outdoor-Fan Contactor
CR	— Control Relay	**PEC**	— Power Exhaust Controller
DIP	— Dual In-Line Package	**PES**	— Power Exhaust Sequencer
EQUIP	— Equipment	**PESC**	— Power Exhaust Sequencer Controller
FU	— Fuse	**SIO**	— Serial Input/Output
GND	— Ground	**TB**	— Terminal Block
HR	— Heater Relay	**TRAN**	— Transformer

Fig. 24 — Control Box Diagram (Sizes 054-068)

Thermostat Wiring (CV Only) — Install a Carrier-approved accessory thermostat assembly (per current price pages) according to the installation instructions included with the accessory or these instructions. Locate the thermostat on a solid interior wall in the conditioned space to sense the average temperature.

Route the thermostat cable or equivalent single leads of colored wire from the subbase terminals to the low-voltage connection as shown on unit label wiring diagram and in Fig. 25.

NOTE: For wire runs up to 50 ft, use no. 18 AWG (American Wire Gage) insulated wire (35 C minimum). For 50 to 75 ft, use no. 16 AWG insulated wire (35 C minimum). For over 75 ft, use no. 14 AWG insulated wire (35 C minimum). All wire larger than no. 18 AWG cannot be directly connected at the thermostat and will require a junction box and splice at the thermostat.

Set heat anticipators to 0.1 for all voltages. Settings may be changed slightly to provide a greater degree of comfort for a particular installation.

Sensor Wiring (CV or VAV) — The temperature sensor is wired into the unit control board. See Fig. 26.

The unit is controlled with a T-55 or T-56 (CV only) zone sensor. Terminal TH (T-56) or T1 (T-55) on the sensor is connected to T1 of the base module board. Terminal COM (T-56) or T2 (T-55) on the sensor is connected to T2 on the base module board. If a T-56 set point override sensor is used, the override connection SW on the sensor is connected to T3 on the base module board.

If more than sensor is being used and averaged, sensors must be wired in multiples of 4 or 9. See Fig. 27.

Heat Interlock Relay — VAV units require a field-supplied heat interlock relay (HIR) to drive the air terminal wide open when in heat mode. Heat Interlock relay part number is HN61KK040.

Remote Field Control — A switch closure across terminals R and W1 on TB-3 will initiate the Occupied mode. This can be done manually as well as through a field-supplied timeclock.

Service Tool, Building Supervisor, and ComfortWorks™ Software — Access to the control board can be achieved through the terminal marked CCN via a 3-wire bus.

> IMPORTANT: The default bus address is 0. The default element number is 1. Refer to CCN literature to change the default values, if needed.

Carrier Comfort Network Interface — The 48E units can be connected to the CCN. The communication bus wiring is supplied and installed in the field. Wiring consists of shielded, 3-conductor cable with drain wire.

The system elements are connected to the communication bus in a daisy chain arrangement. The positive pin of each system element communication connector must be wired to the positive pins of the system element on either side of it, the negative pins must be wired to the negative pins, and the signal pins must be wired to signal ground pins. Wiring connections for CCN should be made at the 3-pin plug (CCN located at the base board). Consult CCN literature for further information.

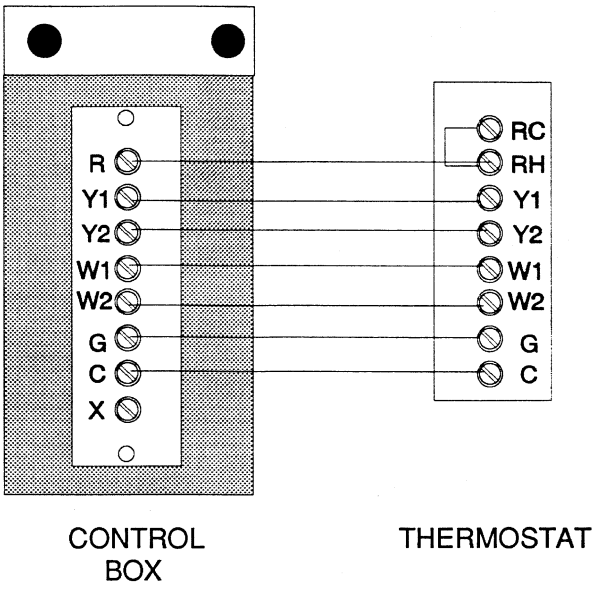
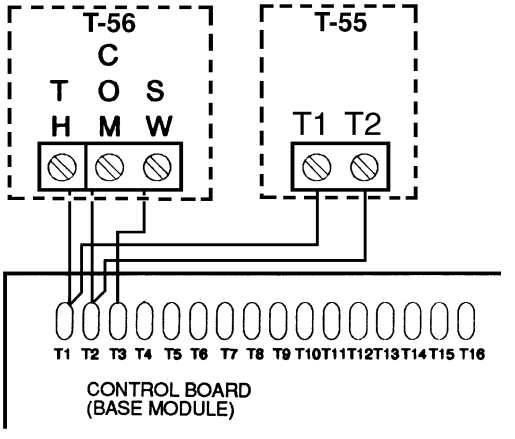


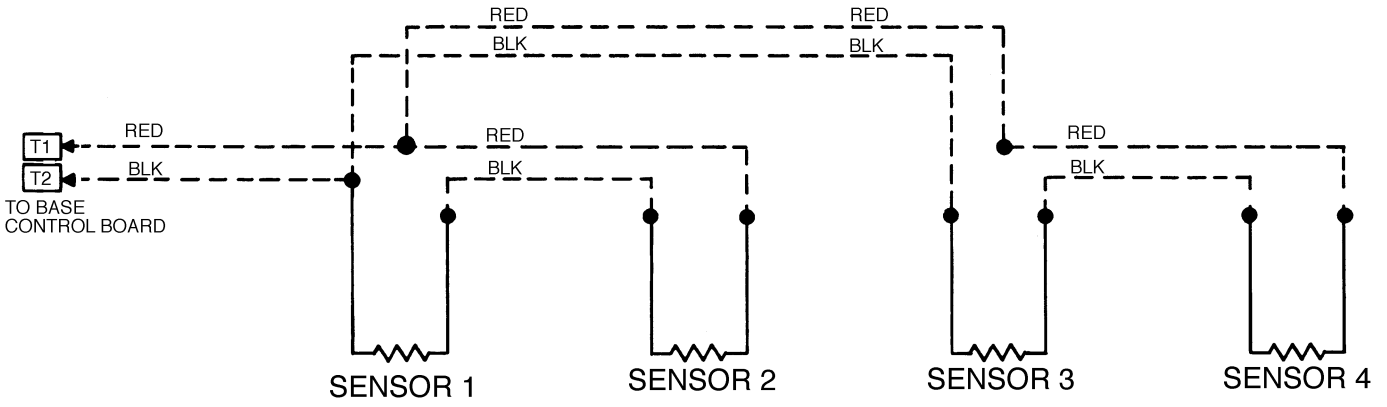
Fig. 25 — Field Control Thermostat Wiring



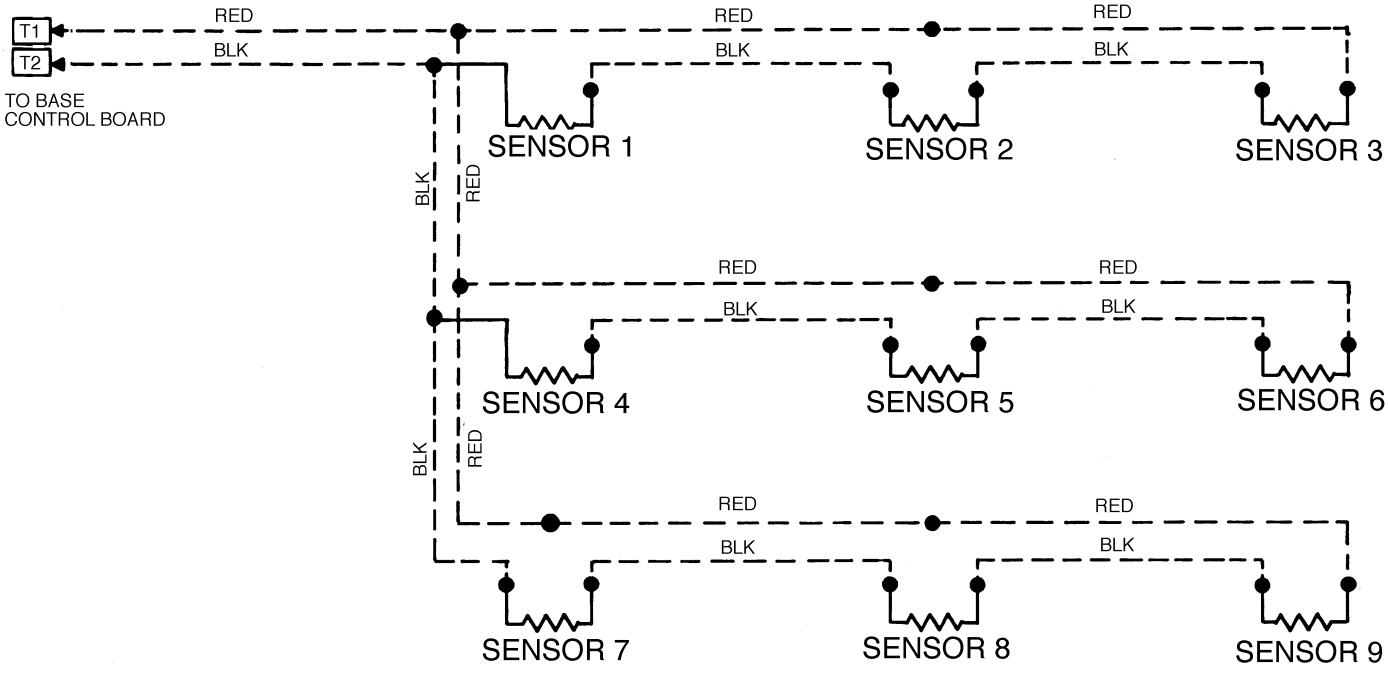
NOTE: Sensor part numbers are as follows:

T-55 — CEC0121448-01
T-56 — CEC0121503-01

Fig. 26 — Field Control Temperature Sensor Wiring (CV or VAV Units)



SPACE TEMPERATURE AVERAGING — 4 SENSOR APPLICATION



SPACE TEMPERATURE AVERAGING — 9 SENSOR APPLICATION

Fig. 27 — Space Temperature Averaging Wiring

Conductors and drain wire must be 20 AWG minimum stranded, tinned copper. Individual conductors must be insulated with PVC, PVC/nylon, vinyl, Teflon, or polyethylene. An aluminum/polyester 100% foil shield and an outer jacket of PVC, PVC/nylon, chrome vinyl, or Teflon with a minimum operating temperature range of −20 C to 60 C (−4 F to 140 F) is required. Table 6 lists cables that meet the requirements.

Table 6 — CCN Connection Approved Shielded Cables

MANUFACTURER	CABLE PART NO.
Alpha	2413 or 5463
American	A22503
Belden	8772
Columbia	02525

IMPORTANT: When connecting the CCN communication bus to a system element, use a color coding system for the entire network to simplify installation and checkout. See Table 6.

Table 7 — Color Code Recommendations

SIGNAL TYPE	CCN BUS CONDUCTOR INSULATION COLOR	CCN PLUG PIN NO.
Positive (+)	RED	1
Ground	WHITE	2
Negative (−)	BLACK	3

NOTE: If a cable with a different color scheme is selected, a similar color code should be adopted for the entire network.

At each system element, the shields of the communication bus cables must be tied together. If the communication bus is entirely within one building, the resulting continuous shield must be connected to a ground **at one point only**. If the communication bus cable exits from one building and enters another, the shields must be connected to grounds at the lightning suppressor in each building where the cable enters or exits the building (one point per building only).

To connect the unit to the network:

1. Turn off power to the control box.
2. Cut the CCN wire and strip the ends of the red (+), white (ground), and black (−) conductors. (If a different network color scheme is used, substitute appropriate colors.)
3. Remove the 3-pin male plug from the base module in the main control box, and connect the wires as follows:
   a. Insert and secure the red (+) wire to terminal 1 of the 3-pin plug.
   b. Insert and secure the white (ground) wire to terminal 2 of the 3-pin plug.
   c. Insert and secure the black (−) wire to terminal 3 of the 3-pin plug.
4. Insert the plug into the existing 3-pin mating connector on the base module in the main control box.

Step 10 — Make Outdoor-Air Inlet Adjustments

ECONOMIZER

NOTE: If accessory power exhaust or barometric relief packages are being added to the unit, install power exhaust or barometric relief before installing economizer hoods.

Economizer Hood Assembly — The economizer hood is shipped in a package secured to the outside of the unit, behind the indoor access panel. The hood assemblies must be field-assembled. The 48EW,EY units are side supply and side return. The return duct limits access to economizer filters from below. Filter tracks (mounting angle without tabs) must be installed correctly to allow access to economizer filters from each side.

The 024-048 units have two hoods on every unit. Each hood has two lower filter tracks, one slotted side and one side without slots. Construct the assembly so that the slotted side is adjacent to the other hood when mounted on the unit.

The 054-068 units have 3 hoods on every unit. Each hood has two lower filter tracks, one slotted side and one side without slots. Construct the two outer hood assemblies so that the slotted sides are adjacent to the center hood when mounted on the unit.

NOTE: Before assembly of the economizer hood, check along the outer edges of the economizer assembly for any seal strip protruding past the flanges. Trim the excess seal strip so that it is flush with the economizer assembly flanges.

Perform the following procedure to assemble the economizer hood.

1. Apply black seal strip (provided in package) to outside top-edge of hood sides. Wrap seal strip over edge to cover top flange (6 hood sides). Make sure seal strip covers screw holes. Allow strip to overhang ⅛-in. past the end opposite the mounting flange. See Fig. 28.
2. Assemble hood sides, top, and cross member with gasketed screws provided. See Fig. 29.
3. Attach 15 green speed clips (provided) to hood top.
4. Apply black seal strip (provided) to mounting flanges of hood sides being sure to cover mounting holes. See Fig. 30.

   NOTE: Each hood assembly has one hood side with slots and one hood side without slots. On the 024-048 units, the two outer hood assemblies must have the hood sides with the slots located adjacent to each other when mounted on the unit. On the 054-068 units, the two outer hood assemblies must have the hood sides with the slots located adjacent to the center hood. The center hood assembly should have hood side with slots locted on the left side.
5. Apply black seal strip (provided) to hood top mounting flange. Seal strip of hood top mounting flange must press tightly against seal strip of hood side mounting flanges. See Fig. 31.
6. Add gray foam strip (provided in package) to cross members on bottom tray. See Fig. 32.
7. Place gray foam strip (provided) on inside of slotted hood side between filter and cross member opposite the mounting end. See Fig. 33.
8. Attach gray foam strip (provided) to block-off baffle on outer face of flange. See Fig. 34.
9. Remove the screws on each end and along top of damper assembly of unit. Remove top 4 screws on each side of filter panel under damper assembly. Set hood assembly in place and attach to unit using these screws.
10. Attach accessory enthalpy bracket on hood side furthest from control box end. Locate bracket on inside upper right-hand corner of economizer hood using hood mounting holes. Mount outdoor-air thermistor to enthalpy bracket (if purchased). Attach and wire enthalpy assembly. Place quick connects on enthalpy wires.
11. Remove screws along bottom of damper assembly. Locate and mount blockoff baffle using these screws.
12. Assemble 2 filter tracks side-by-side with the assembled ends together.
13. Attach mounting angle (without tabs) to the assembled end of the filter track. See Fig. 35.
14. Attach 9 green speed clips (provided) to hood side panels without slots. Engagement section of clip faces up and towards the outside of the hood side panels.
15. Attach remaining mounting angle (with tabs) to other end of the filter track with no. 10 screws provided. See Fig. 36.
16. Place filter track assembly in bottom of hood by placing tabbed end into slotted side (with tab on bottom) and attaching opposite end to hood with speed clips and gasketed screws provided. Tabs can be hand bent after they have been inserted into the side.

    NOTE: The filter track assembly end with screws should face away from the other hood when mounted on the unit. Be sure the filters are installed with the airflow in the correct direction.

    NOTE: Tabs from both filter tracks will be in the same space. After one filter track has been inserted into hood side, bend the tabs so they will not interfere with installation of the second/center hood.
17. Attach black seal strip (provided) to filter cover. Seal strip should be applied centered over the holes of the one flange, making sure to fully cover holes and centered over the other large flange. See Fig. 37.
18. Slide two 20 x 25-in. filters into cross members of hood assembly. Attach filter cover over filters with screws and speed clips provided.

Minimum Damper Position (MDP) Setting — Setting of the outdoor air damper position is performed in conjunction with a shortened version of the field run test. This is performed by first opening DIP (Dual In-line Package) switch no. 4 then no. 6. See Fig. 20 and Direct Digital Controls DIP Switch Configuration section on page 45.

The outdoor-air damper closes. The control allows 90 seconds for the damper to close in case it is in the full open position. Next, the indoor-fan contactor will energize. The outdoor-air damper will remain at 0% for 30 seconds. It will then move to the 10% position for another 30 seconds. This will be repeated at every 10% increment for 30 seconds until the damper reaches 100% open. Close DIP switch no. 4 during the 30 seconds immediately after the desired outdoor air minimum damper position. The 30-second time period is to allow time where DIP switch no. 4 can be closed. The default value of the minimum outdoor air damper position is 20%. If the desired minimum position is 30%, allows the damper position to go to 10% for 30 seconds, then 20% for 30 seconds, and when it reaches 30% close DIP switch no. 4 during the 30-second period following the 30% position.

The minimum outdoor air damper position is now set. Close DIP switch no. 6.

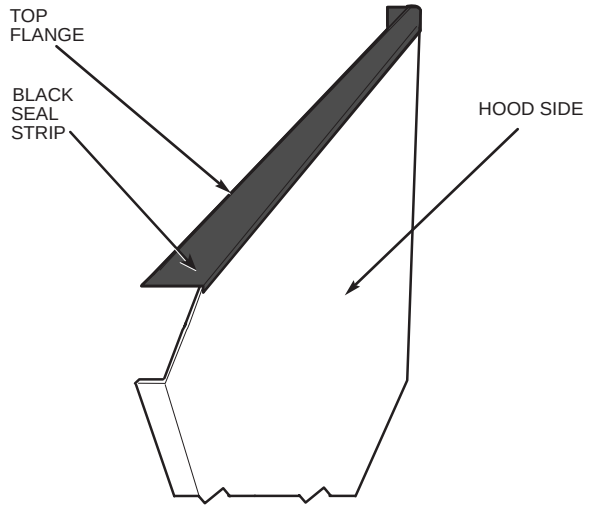
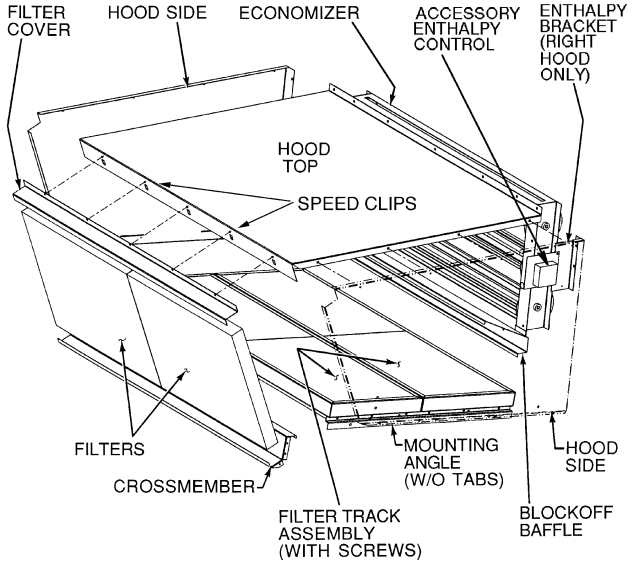


Fig. 28 — Adding Seal Strip to Top of Hood Sides



NOTE: Left side economizer hood has mounting angle without tabs and filter track assembled end on the opposite side.

Fig. 29 — Economizer Hood Assembly (Right Side/Center Economizer Hood Shown)

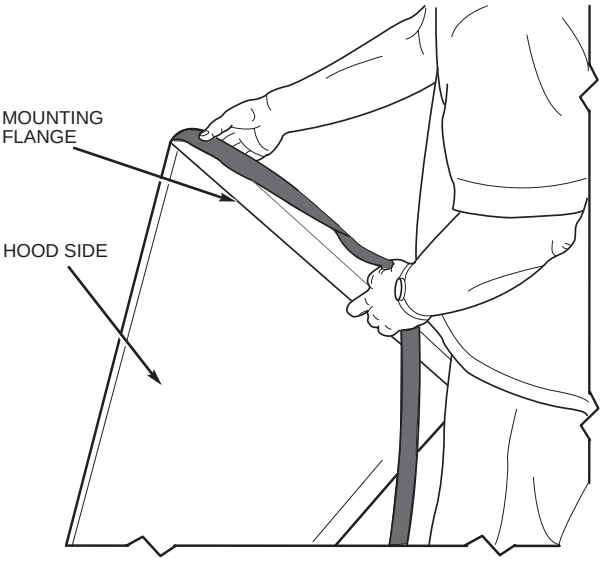


Fig. 30 — Adding Seal Strip to Hood Top Mounting Flange

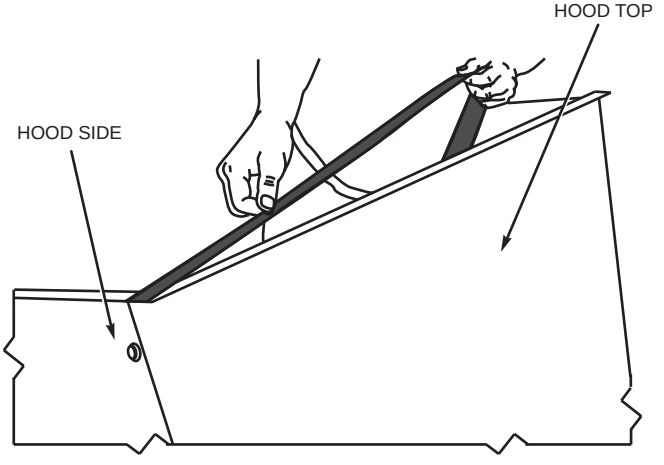


Fig. 31 — Adding Seal Strip to Hood Top Mounting Flange

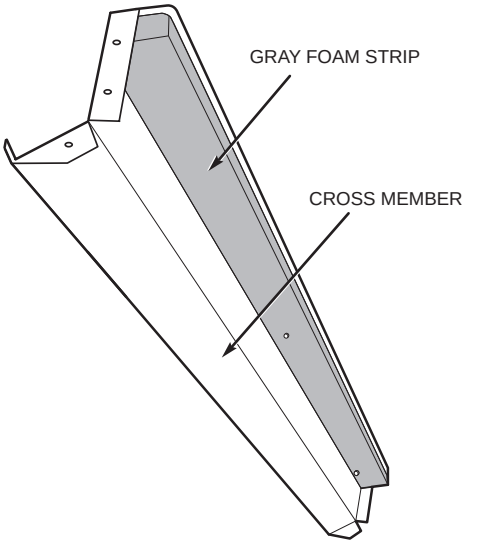


Fig. 32 — Adding Foam Strip to Cross Member

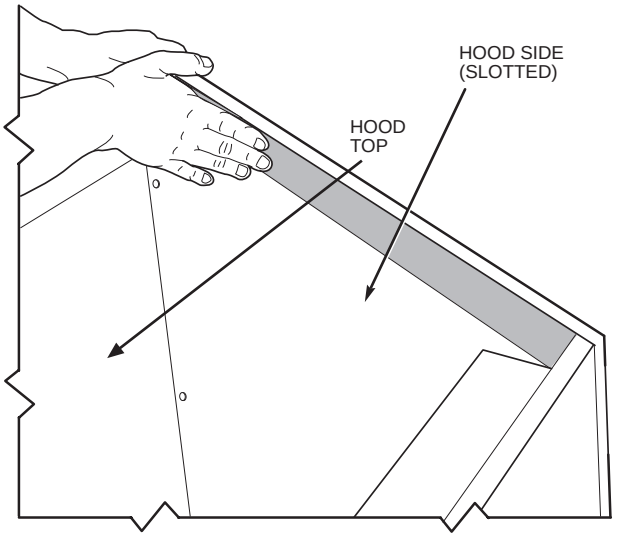


Fig. 33 — Adding Foam Strip to Hood Side

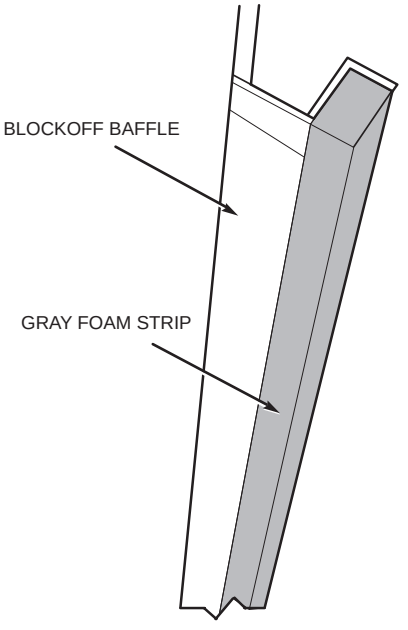


Fig. 34 — Adding Foam Strip to Blockoff Baffle

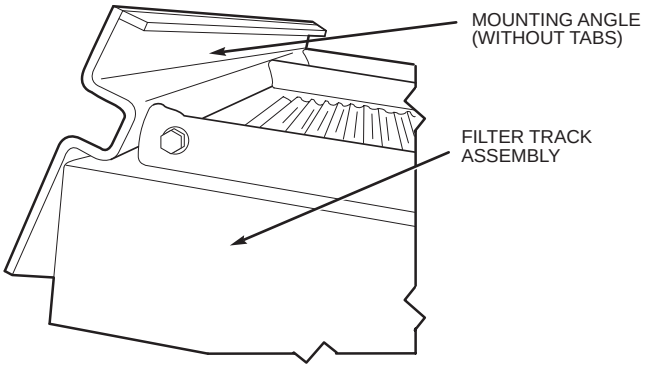


Fig. 35 — Mounting Anble (Without Tabs) Attached to Filter Track Assembly

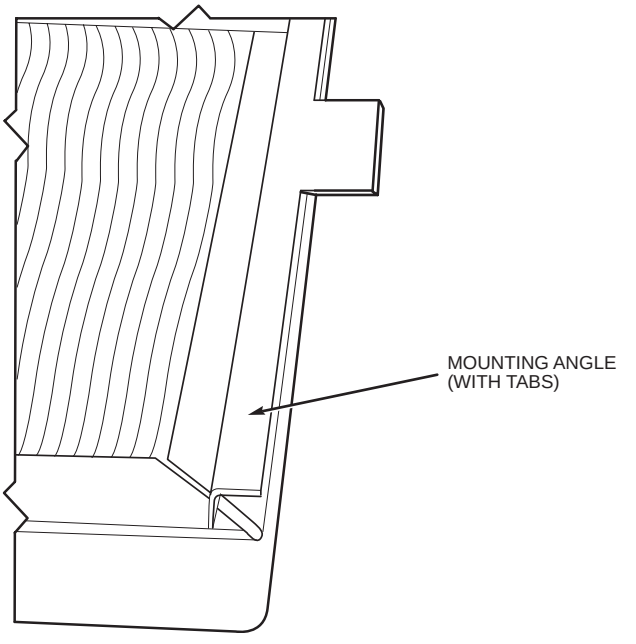


Fig. 36 — Mounting Angle (With Tabs) Attached to Filter Track Assembly

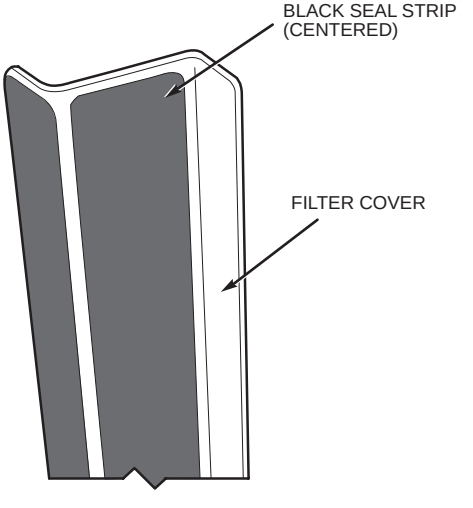


Fig. 37 — Attaching Seal Strip to Filter Cover

ECONOMIZER SETTINGS

Accessory Enthalpy Control (Fig. 38) — The control (HH57AC077) is mounted in the economizer hood. See Fig. 29. The enthalpy setting adjustment is on the enthalpy control. For maximum benefit of outdoor air, set enthalpy control to A. See Fig. 39 and 40.

Enthalpy Control Installation — The outdoor air enthalpy control is installed on the inside panel of the outdoor air hood. The enthalpy control should be mounted when the outdoor air hoods are assembled. To install the control, perform the following procedure:

1. Turn off all power. Ensure disconnect is locked out.
2. Remove the economizer inlet filters from the bottom of the right hand economizer hood. See Fig. 29. See Fig. 41 for economizer details.
3. Mount the outdoor air enthalpy sensor inside the right economizer hood on the right side panel of the hood, adjacent to the outdoor-air thermistor.
4. Locate the red, violet, and brown wires near the outdoor air thermistor. Remove the splice from the red and violet wires. Remove the cap from the brown wire.
5. Install a ¼-in. push on terminal (field-supplied) on the violet and brown wires.
6. Connect a ¼-in. push on terminal (field-provided) to one end of a 18-gage, 6-in. jumper wire (field-provided). Connect the other end to the red wire and attach a ¼-in. push on connector (field-provided).
7. Connect the red wire with the jumper to terminal TR1. Connect the jumper to terminal 2. Connect the brown wire to terminal TR. Connect the violet wire to terminal 3. All connections are on the enthalpy control.
8. Replace the economizer filters.
9. Return power to unit.

Accessory Differential Enthalpy Control (Fig. 38) — The control (HH57AC077), in conjunction with the accessory enthalpy sensor (HH57AC078), controls economizer operation according to the differential enthalpy. The control is mounted in the economizer hood. The sensor is mounted in the return duct (48EJ,EK) or return air plenum (48EW,EY).

Differential Enthalpy Sensor Installation — To install the control, perform the following procedure:

1. Turn off all power. Ensure disconnect is locked out.
2. Remove the economizer inlet filters from the bottom of the right hand economizer hood. See Fig. 29.
3. Remove the factory-installed, 620-ohm jumper between terminals SR and + on the enthalpy control located inside the outdoor air hood.
4. Connect the violet wire from the enthalpy sensor kit to the + terminal on the enthalpy control. Connect the blue wire from the enthalpy sensor kit to the SR terminal on the enthalpy control.
5. Turn the enthalpy control set point potentiometer clockwise past the ''D'' setting on the enthalpy control to configure the control to operate on differential enthalpy. See Fig. 39.
6. Remove the return-air enthalpy sensor from the accessory package. Using the screws provided, mount the sensor inside the return duct near the unit. Do not locate the control too far from the unit, or the wires will not reach from the sensor to the control. On 48EW,EY units, the enthalpy sensor can be installed in the return air section of the unit, under the return air dampers.
7. Route the wires from the enthalpy sensor to the return air enthalpy control through the holes on the inside of the hinged filter access panel. The holes are blocked by plug buttons which should be removed.
8. Use field-supplied wire ties to attach the violet wire to the + terminal and the blue wire to the SR terminal.
9. Replace economizer filters.
10. Return power to unit.

Disable Economizer — For applications where the economizer will not be used (areas of high humidity), the economizer should be disabled. To disable the economizer, perform the following:

1. Turn of power. Lock out disconnect.
2. Locate the OAT (Outdoor Air Thermostat) in the right hand outdoor air damper area.
3. Locate the splice connecting the violet wire coming from T24 on the base module board to the red wire coming from T29 on the base module board. Remove the wire nut and break the red to violet wire splice.
4. Cap off both wires. When the connection is broken the base module is fooled into thinking that the enthalpy is not acceptable and economizer operation is disabled.

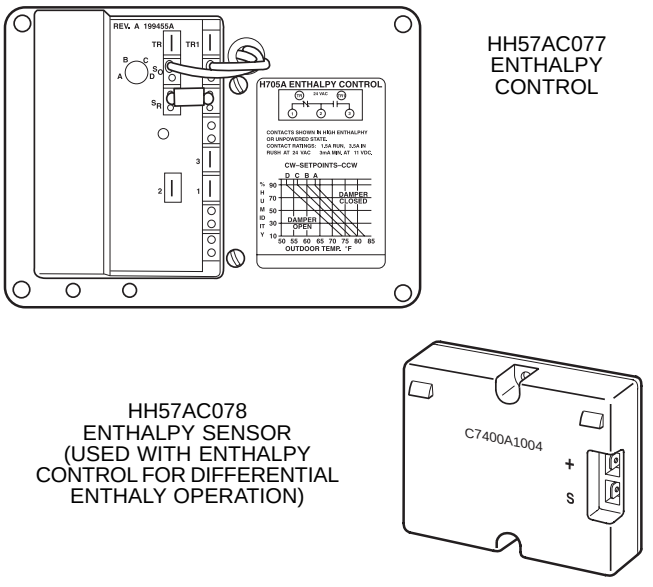
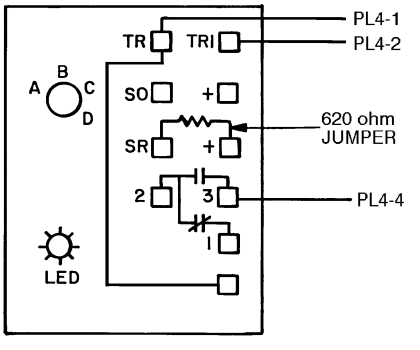


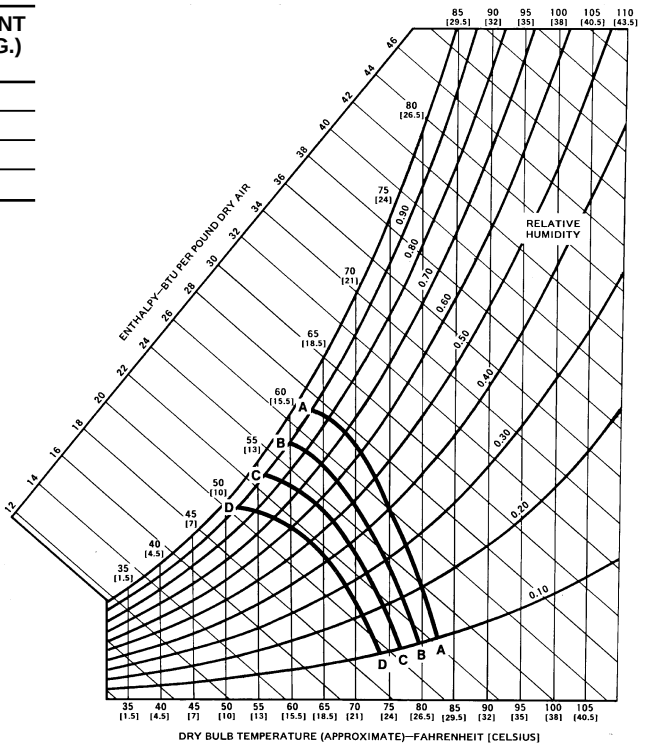
Fig. 38 — Differential Enthalpy Control and Sensor



NOTE: Switches shown in high enthalpy state. Terminals 2 and 3 close on enthalpy decrease.

Fig. 39 — Wiring Connections for Solid-State Enthalpy Control (HH57AC077)

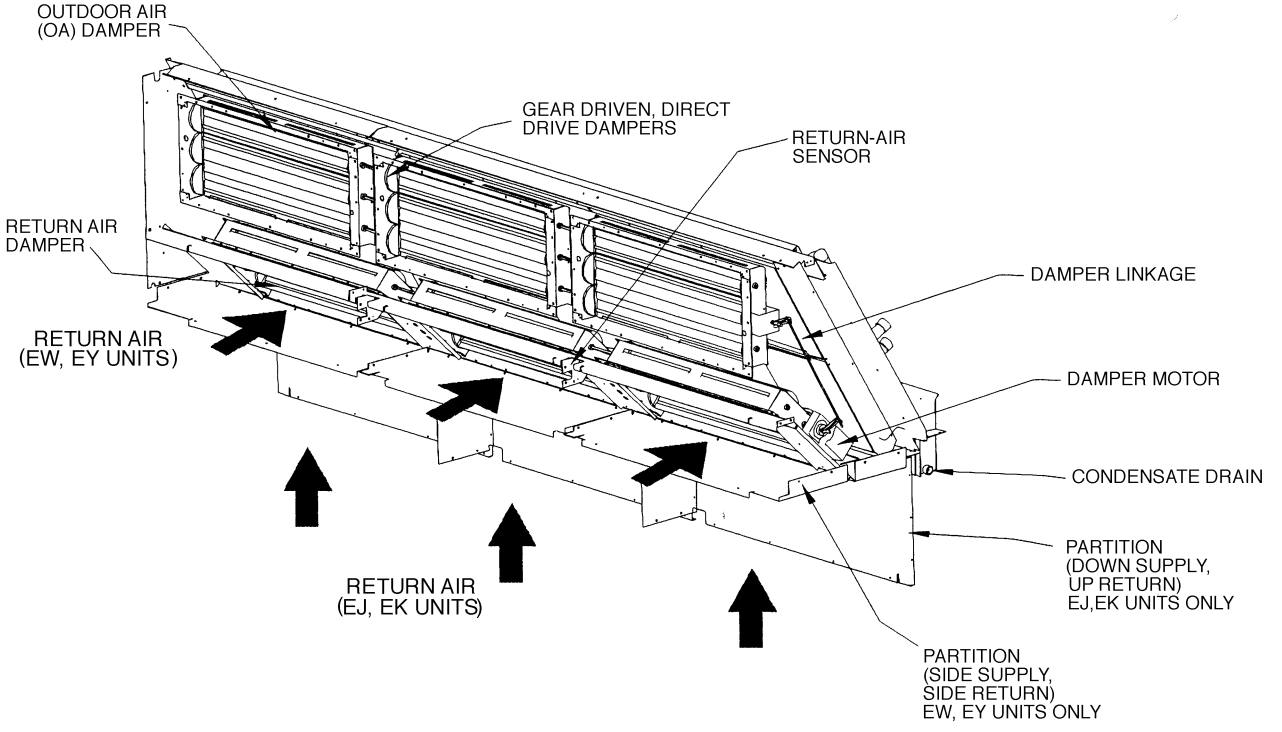
CONTROL CURVE	CONTROL POINT (APPROX. DEG.) AT 50% RH
A	73 (23)
B	70 (21)
C	67 (19)
D	63 (17)



LEGEND

RH — Relative Humidity

Fig. 40 — Psychrometric Chart for Enthalpy Control


OUTDOOR AIR (OA) DAMPER
GEAR DRIVEN, DIRECT DRIVE DAMPERS
RETURN-AIR SENSOR
RETURN AIR DAMPER
DAMPER LINKAGE
RETURN AIR (EW, EY UNITS)
DAMPER MOTOR
CONDENSATE DRAIN
PARTITION (DOWN SUPPLY, UP RETURN) EJ,EK UNITS ONLY
RETURN AIR (EJ, EK UNITS)
PARTITION (SIDE SUPPLY, SIDE RETURN) EW, EY UNITS ONLY

NOTE: Partitions shown indicate both side supply (EW,EY) and vertical supply (EJ,EK) units.

Fig. 41 — Economizer Details

Step 11 — Position Power Exhaust/Barometric Relief Damper Hood — All electrical connections have been made and adjusted at the factory. The power exhaust blowers and barometric relief dampers are shipped assembled and tilted back into the unit for shipping. Brackets and extra screws are shipped in shrink wrap around the dampers. If ordered, each unit will have 4 (sizes 024-048) or 6 (sizes 054-068) power exhaust blowers and motors or 4 (sizes 024-048) or 6 (sizes 054-068) barometric relief dampers.

1. Remove 9 screws holding each damper assembly in place. See Fig. 42. Each damper assembly is secured with 3 screws on each side and 3 screws along the bottom. Save screws.

⚠ CAUTION

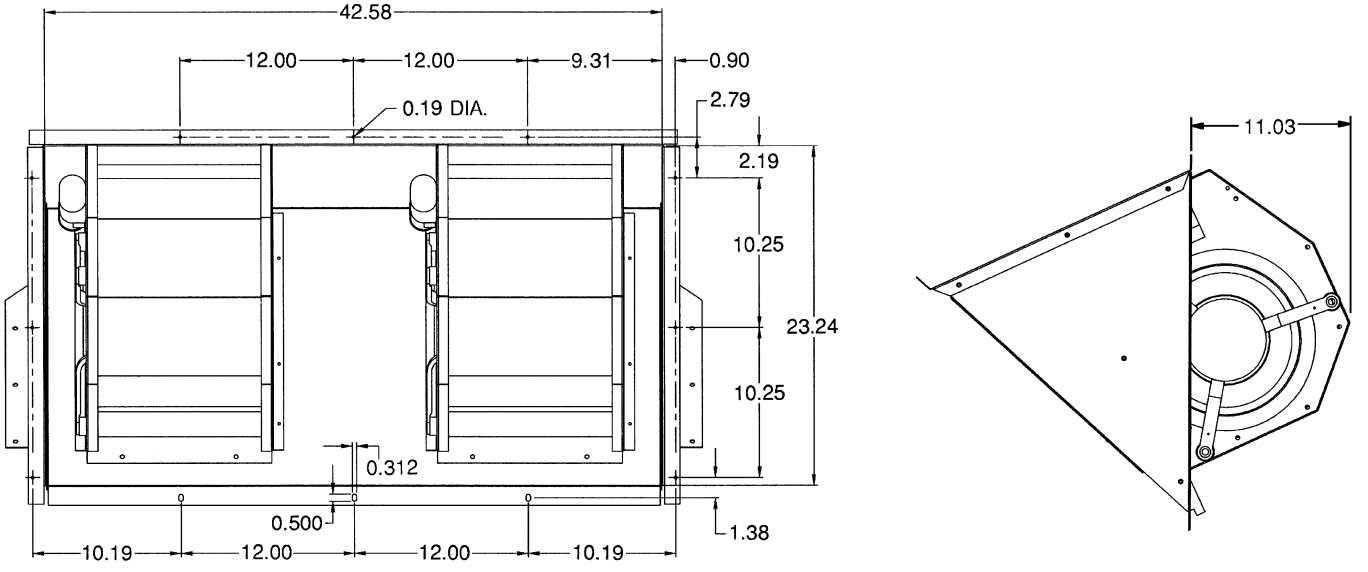
Be careful when tilting blower assembly. Hoods and blowers are heavy and can cause injury if dropped.

2. Pivot each damper assembly outward until edges of damper assembly rest against inside wall of unit.
3. Secure each damper assembly to unit with 6 screws across top (3 screws provided) and bottom (3 screws from Step 1) of damper.
4. With screws saved from Step 1, install brackets on each side of damper assembly.
5. Remove tape from damper blades.

VAV DUCT PRESSURE TRANSDUCER — The VAV duct pressure transducer (VAV inverter pressure transducer) is located behind the filter access door on the lower inner panel. See Fig. 43. A section of field-supplied ¼-in. plastic tubing must be run from the high pressure tap on the differential pressure switch and connected to a field-supplied tap in the supply-air duct. The tap is usually located ⅔ of the way out on the main supply duct. Remove plug button in panel to route tubing.

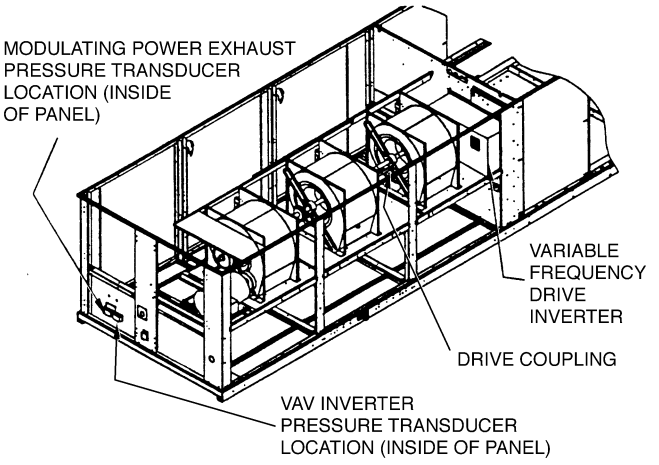
VAV BUILDING PRESSURE TRANSDUCER — The VAV building pressure transducer (modulating power exhaust pressure transducer) is located behind the filter access door on the lower inner panel. See Fig. 43. A section of field-supplied ¼-in. plastic tubing must be run from the high pressure tap on the differential pressure switch to the conditioned space. The pressure tube must be terminated in the conditioned space where a constant pressure is required. This location is usually in an entrance lobby so that the building exterior doors will open and close properly. Remove plug button in panel to route tubing.

The low pressure tap is factory-routed to the atmosphere. For a positive-pressure building, route the high tap to building air and low tap to atmosphere. For a negative-pressure building, route the high tap to atmosphere and the low tap to building air.



NOTES:
1. Unless otherwise specified, all dimensions are to outside of part.
2. Dimensions are in inches.
3. On 48EW,EY units, accessory barometric relief or power exhaust must be mounted in the field-supplied return ductwork.

Fig. 42 — Barometric Relief Damper and Power Exhaust Mounting Details


MODULATING POWER EXHAUST PRESSURE TRANSDUCER LOCATION (INSIDE OF PANEL)
VARIABLE FREQUENCY DRIVE INVERTER
DRIVE COUPLING
VAV INVERTER PRESSURE TRANSDUCER LOCATION (INSIDE OF PANEL)

LEGEND

VAV — Variable Air Volume

Fig. 43 — Pressure Transducer Locations (054-068 size shown)

Step 12 — Install All Accessories — After all the factory-installed options have been adjusted, install all field-installed accessories. Refer to the accessory installation instructions included with each accessory.

MOTORMASTER® III CONTROL INSTALLATION

Install Field-Fabricated Wind Baffles — Wind baffles must be field-fabricated for all units to ensure proper cooling cycle operation at low-ambient temperatures. See Fig. 44 for baffle details. Use 20-gage, galvanized sheet metal, or similar corrosion-resistant metal for baffles. Use field-supplied screws to attach baffles to unit. Screws should be ¼-in. diameter and ⅝-in. long. Holes for wind baffles are pre-punched in the unit sheet metal.

⚠ CAUTION

To avoid damage to the refrigerant coils and electrical components, use recommended screw sizes only.

The wind baffles attach to flanges formed on the outer sheet metal of the unit corner post. The other end of the baffle is attached to the center panel between the condenser coil and the indoor section. Two baffles are required.

Install Motormaster III Controls — Only one Motormaster III control is required per unit.

Motor — One outdoor-fan motor (OFM) must be changed out in the field to accommodate the Motormaster III accessory. The replacement motor part no. is HD52AK652.

For size 024-034 units, the Motormaster controlled OFM is located at the right side of the unit looking from the compressor end. The other OFM is controlled to shut off at 55 F and on at 65 F outdoor-air temperature and does NOT need to be changed out. The no. 1 and 2 OFMs are intended to run at all ambient temperatures.

For size 038-054 units, the Motormaster controlled OFM is no. 3 OFM and is located at the left side of the unit looking from the compressor end and the second motor back. The no. 4 OFM is controlled to shut off at 55 F and on at 65 F outdoor-air temperature and does NOT need to be changed out. The no. 1 and 2 OFMs are intended to run at all ambient temperatures.

For size 058-068 units, the Motormaster controlled OFM is no. 3 OFM and is located at the left side of the unit looking from the compressor end and the second motor back. The no. 4, 5, and 6 OFMs are controlled to shut off at 55 F and on at 65 F outdoor-air temperature and do NOT need to be changed out. The no. 1 and 2 OFMs are intended to run at all ambient temperaturees.

Sensor — Install the sensor for thermistor input control in the location shown in Fig. 45A-E. Connect sensor leads to the violet and gray control signal leads on the Motormaster III control.

Signal Selection Switch — Remove the cover of the Motormaster III control. Set the switch to accept the thermistor sensor input signal. Set the frequency to match the unit power supply (60 Hz).

Motormaster III Control — The recommended mounting location is in the indoor fan section, mounted on the panel that separates the indoor and outdoor sections. On VAV units, this location is next to the VFD.

Do not route the Motormaster III control wiring next to the VFD on VAV units. Use a separate connector through the partition when wiring to the OFM.

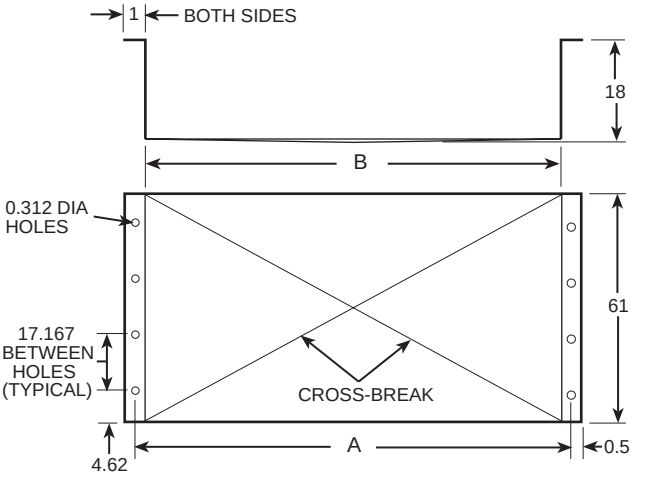
Electrical Connections

⚠ WARNING

To avoid possibility of electrical shock and personal injury, turn off all power to unit before making electrical connections.

When replacing the OFM, reconnect the black, yellow, and blue wires form the outdoor fan contactor to the black, yellow, and blue wires of the Motormaster III control. Run new wires from the red, orange, and brown wires to the leads of the new OFM. Connect the green wire from the control to ground.

NOTE: On all 575-v units, 2 transformers (part no. HT01AH851) must be used for each Motormaster III control to lower the supply voltage to the control to 460-v. Transformers can be mounted anywhere outside the control box.



UNIT SIZE	A	B
024-054	80.5	79.5
058-068	120.5	119.5

NOTE: All dimensions are in inches. Material: 20 gage galvanized steel or other non-corrosive material.

Fig. 44 — Motormaster III Control Baffle Details

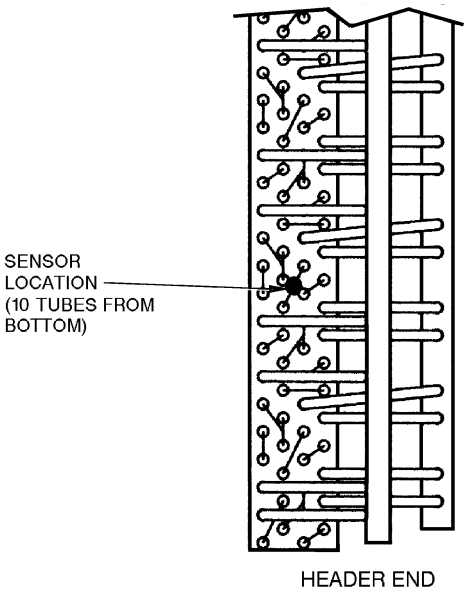


Fig. 45A — Motormaster® III Sensor Location (Sizes 024-034)

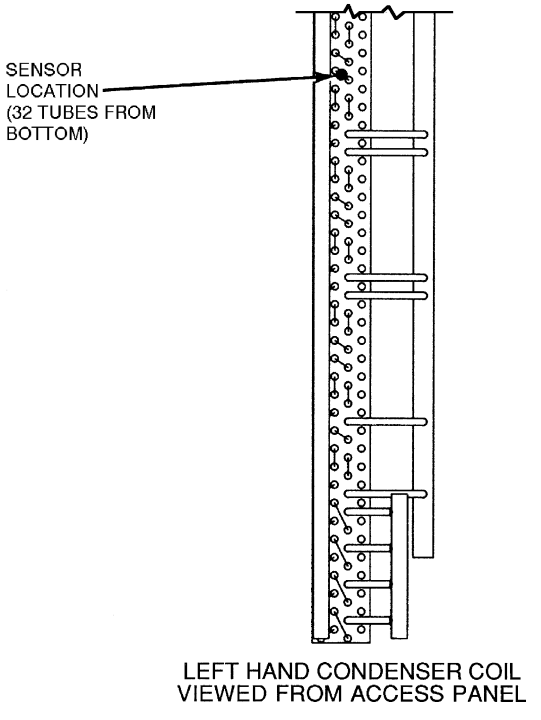


Fig. 45B — Motormaster III Sensor Location (Sizes 038 and 044)

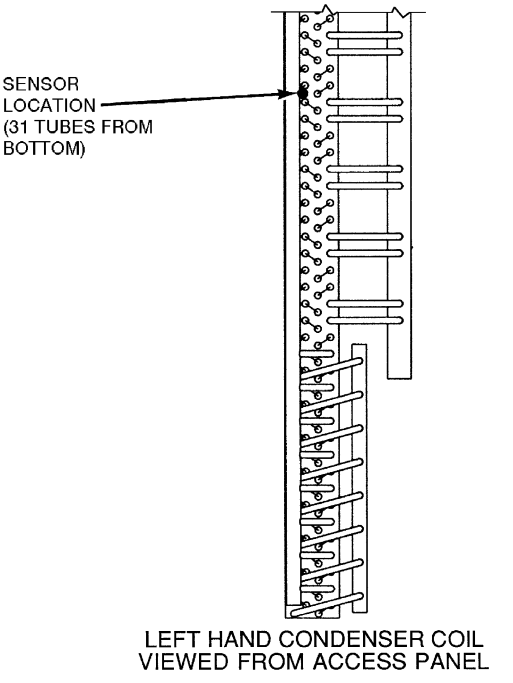


Fig. 45C — Motormaster III Sensor Location (Size 048)

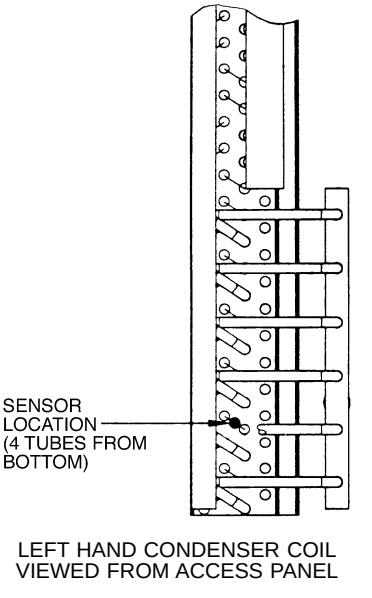


Fig. 45D — Motormaster III Sensor Location (Sizes 054-064)

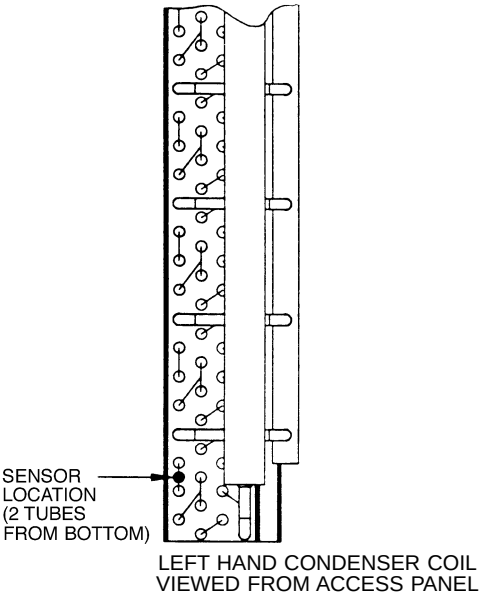


Fig. 45E — Motormaster® III Sensor Location (Size 068)

START-UP

Use the following information and Start-Up Checklist on page CL-1 to check out unit PRIOR to start-up.

Unit Preparation — Check that unit has been installed in accordance with these installation instructions and applicable codes.

Compressor Mounting — Loosen the compressor holddown bolts until sidewise movement of the washer under each holddown bolt head can be obtained. Do not loosen completely as bolts are self-locking and will maintain adjustment.

Service Valves — Ensure that the suction, discharge, and liquid line service valves are open. Damage to the compressor could result if they are left closed.

Internal Wiring — Check all electrical connections in unit control boxes; tighten as required.

Refrigerant Service Ports — Each refrigerant system has one suction port located in the top of the compressor motor casing. All units also have one service port on the liquid line valve and one on the compressor discharge valve. Be sure that caps on the ports are tight.

Crankcase Heaters — Crankcase heaters are energized as long as there is power to the unit, except when the compressors are operating.

IMPORTANT: Unit power must be on for 24 hours prior to start-up. Otherwise, damage to compressor may result.

Variable Frequency Drive (VFD) — The variable frequency drives are factory set. These settings include factory-installed jumpers and software configurations. The only field configured set point is duct static pressure. An Operation Manual is shipped with each VAV unit. This manual should be used if the drive needs to be customized for a particular application.

NOTE: The VFD will always provide the proper phase sequence to the indoor-fan motor. The indoor-fan motor operates in proper rotation regardless of the phase sequence to the unit. If, upon start-up, the outdoor fans operate backwards but the indoor fan operates in the correct direction, reverse any two leads to the main terminal block. All fans will then operate in the correct direction.

To set the duct static pressure, perform the following steps. The factory setting is zero. The duct transducer has a range from 0 to 5 in. wg. The transducer output is 4 to 20 mA, therefore, 0 to 5 in. wg is proportional to the 4 to 20 mA and must be expressed to the VFD in terms of percentage of the frequency range. Refer to Table 8. The set point value is a percentage of the maximum output frequency. Locate the duct static pressure closest to that desired and use the corresponding set point value. If necessary, interpolation between duct static pressures is permissible.

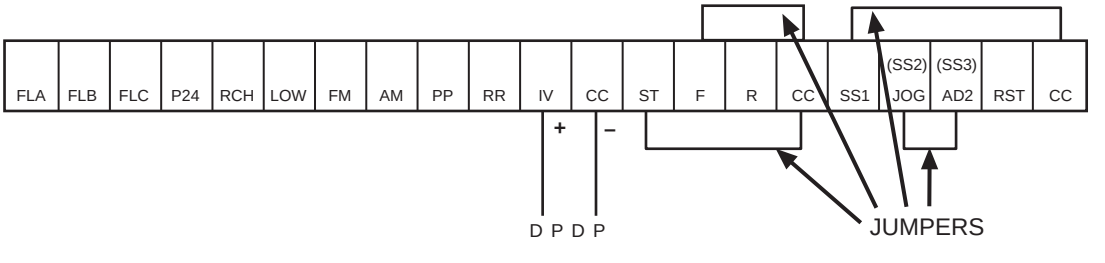
To set the VFD, the VFD must be powered up; however, since it is located near the indoor air fan, operation of the fan is not desirable. To disable the fan, perform the following procedure:

1. Open the indoor fan circuit breaker.

⚠ WARNING

A high voltage potential can exist with the indoor fan circuit breaker open. The charge LED, located in the top right-hand corner of the VFD control board, will indicate charged capacitors. DO NOT TOUCH internal high voltage parts if LED is lit.

2. Remove the jumper between CC and ST on the terminal strip of the VFD (see Fig. 46).
3. Close the indoor fan circuit breaker. The VFD now is powered but the fan will not operate.



NOTE: Terminal strip is located inside the VFD at the bottom.

Fig. 46 — VFD Factory-Installed Jumpers

4. For 208/230-v and 460-v units, on the front of the VFD is a keypad and display which will be used to enter the set point. To access this field, press the PRG key until the display reads S.PrG (Speed Group Parameters). Press the ARROW key until Sr1 is displayed. This is the VFD duct pressure set point listed in Table 8. For 575-v units, press either the UP or DOWN ARROW key once to display the preprogrammed set point. This is the VFD duct pressure set point listed in Table 8.
5. For 208/230-v and 460-v units, press the READ/WRITE key. The set point value will be displayed. Use the UP or DOWN ARROW key to adjust the set point value to the value desired. For 575-v units, press the UP or DOWN ARROW key to adjust the set point value to the value desired.
6. Press the READ/WRITE key to enter the new value.
7. Check the factory default values.

   IMPORTANT: The Carrier factory default values for the VFD may be different than the default values of the manufacturer. Refer to the Carrier literature when checking default values. The following default values have been changed from the manufacturer settings to more closely match the VFD operation to a Carrier VAV unit.

   For 208/230- and 460-v units, see Tables 9A and 9B. For 575-v units see Tables 10A and 10B.
8. For 575-v units, a fire speed override is available by contact closure between terminals PP and RR.
9. If the VFD is to be controlled by an external control system, other than the factory-supplied pressure transducer, follow these steps:
   a. Install a jumper between terminals S1 and CC. This jumper will turn off the PID control is the VFD. The VFD is set to follow an external speed reference signal from the control system.
   b. Bring the external speed reference (4 to 20 mA) signal into terminals IV and CC.
10. Open the indoor fan circuit breaker.
11. Replace the jumper between CC and ST on the terminal strip of the VFD.
12. Close the indoor fan circuit breaker; the VFD now is powered and the fan will operate.

NOTE: Any field measurement of supply fan amps must be taken with an RMS (root mean squared) meter between the fan circuit breaker and fan contactor (upstream of VFD).

Table 8 — VFD Supply Air Pressure Set Point

PRESSURE (in. wg)	CONTROL (mA)	VFD SET POINT
0.00	4.0	0
0.25	4.8	3
0.50	5.6	6
0.75	6.4	9
1.00	7.2	12
1.25	8.0	15
1.50	8.8	18
1.75	9.6	21
2.00	10.4	24
2.25	11.2	27
2.50	12.0	30
2.75	12.8	33
3.00	13.6	36
3.25	14.4	39
3.50	15.2	42

LEGEND

VFD — Variable Frequency Drive

Table 9A — Carrier VFD Defaults (208/230-v and 460-v)*

GROUP	PARAMETER	NEW VALUE
Setup	ACC1	60.0 sec
	dEC 1	60.0 sec
	LL	10.0 Hz
	tHr	See Table 9B
	StL	110%
	SEL4	1
J.PrG	Fb.Pl	1
	GP	100
	Gl	50
S.PrG	Sr1	30.0 Hz
	FSoF	60.0 Hz
P.PrG	F.r.	0

LEGEND

VFD — Variable Frequency Drive

*Values are for Tosvert-130 "E2" VFD models only.

NOTE: There is a separate Operation Manual marked "E2" for the VFD that is shipped with each unit. This Operation Manual provides a detailed description of the drive. Utilize the Operation Manual for a description of these parameters.

Table 9B — tHr Settings for VFD (208/230-v and 460-v)

MOTOR		208/230-V tHr SETTING				460-V tHr SETTING			
		Standard Efficiency		High Efficiency		Standard Efficiency		High Efficiency	
Hp	kW	IFM Letter*	Setting	IFM Letter*	Setting	IFM Letter*	Setting	IFM Letter*	Setting
5	**3.73**	A	0.8732	L	0.9450	A	0.9450	L	0.9450
7.5	**5.60**	B	0.9091	M	0.9091	B	0.9917	M	0.9917
10	**7.46**	C	0.9091	N	0.9091	C	0.9481	N	0.9740
15	**11.19**	D	0.9481	P	0.9481	D	0.9524	P	0.9481
20	**14.92**	E	1.0000	Q	0.9798	E	0.9663	Q	0.9663
25	**18.65**	F	0.9626	R	0.9759	F	1.0000	R	0.9706
30	**22.38**	G	1.0000	S	0.9386	G	1.0000	S	0.9477
40	**29.84**	H	0.8065	T	0.8065	H	0.7692	T	0.7692

LEGEND

IFM — Indoor Fan Motor

*The IFM letter refers to position 15 of the unit model number.

Table 10A — Carrier VFD Defaults (575-v)*

GROUP	PARAMETER	NEW VALUE
Gr.Ut	CNOD	1
	FNOD	2
	bLnd	1
	bLPn	1
	bLSt	1
	bLSF	1
	bLPr	1
	bLFb	1
Gr.F	FH	60
	UL	60
	LL	10
	Pt	2
	ACC1	60
	DEC1	60
Gr.Pn	Fr	0
Gr.ST	1t	1
	lt1	13
	lt2	33
Gr.SF	luln	1
	F-P4	60
Gr.Pr	rtry	5
	UuC	1
	ArSt	3
	tHr1	See Table 10B
	OLN	1
	StL1	110
Gr.Fb	FbP1	1
	Gl	2
	PILL	10
	PuL	1
	PuUL	10
	PuLL	10
	Ord1	1
Gr.Ut	tYP	5

LEGEND

VFD — Variable Frequency Drive

*Values are for Tosvert-130 ''G3'' VFD models only.

NOTE: There are two separate instruction pieces for the VFD shipped with each unit. The Operation Manual marked ''G3'' provides a detailed description of the drive. The second piece provides a complete listing of LED displayed program parameters. Utilize the Operation Manual for a description of these parameters.

Table 10B — tHr1 Settings for VFD (575-v)

MOTOR		tHr1 SETTING
Hp	kW	
5	**3.73**	0.8942
7.5	**5.60**	0.7576
10	**7.46**	0.9091
15	**11.19**	1.0000
20	**14.92**	0.9504
25	**18.65**	1.0000
30	**22.38**	1.0000
40	**29.84**	0.8531

Power Exhaust — The optional non-modulating power exhaust (CV only) is a two-stage design where the operation of the exhaust fans is linked to economizer position. When the supply fan is running and the economizer is 25% open, the base module closes contacts, activating 2 (sizes 024-048) or 3 (sizes 054-068) exhaust fans. When the economizer position reaches 75% open, the base module activates the other 2 (sizes 024-048) or 3 (sizes 054-068) exhaust fans. The fans will turn off when the economizer closes below the same points. The economizer position set points that trigger the exhaust fans can be modified, but only through use of the Service Tool, ComfortWorks™, or Building Supervisor software. If single-stage operation is desired, adjust the economizer set points to identical values at the desired point to activate all exhaust fans.

The optional modulating power exhaust (VAV standard, CV optional) is controlled by a modular electronic sequencer system. This system consists of a model R353 signal input module and 4 model S353 staging modules (for sizes 054-068, 6 model 5353 staging modules). The signal input module receives a 0 to 10 vdc signal from the building pressure transducer, which is mounted adjacent to the supply static transducer behind the filter access panel. The modules are mounted just below the unit control board. The left module is the R353, and the 4 or 6 modules on the right are S353 modules for stages 1 through 4 or 6. On the unit wiring label, the R353 is designated PESC, and the S353 modules are designated PES1 through PES4 (PES6 for sizes 054-068).

The building pressure transducer range is −0.5 to + 0.5 in. wg. It is powered by a 0 to 10 vdc signal. A factory-installed hose at the ''Lo'' connection leads to atmosphere, and a field-supplied hose must be connected to the ''Hi'' connection and led into the building to a point where building pressure is to be controlled (positive-pressure building). There is a plug button in the bulkhead just above the transducers, for use in leading the hoses into the building via the return air ductwork.

There are 3 adjustments at the R353 module, all of which have been factory set. In the center of the circuit board is a set of 4 pins with a jumper, labeled J2. This determines the mode of operation. The bottom two pins must be jumpered for direct operation. Direct operation means that the staging modules are activated in sequence as the input signal increases.

At the upper right corner of the board is a set of 5 pins and jumper, which determines the time constant for the control. The time constant is the delay in response built into the controls. The jumper should be on the middle or bottom two pins, for the maximum time constant. The delay can be decreased, if desired, by moving the jumper progressively upward, always jumpering adjacent pins.

At the lower left corner of the board below the terminal strip is a resistor marked R27. This must be removed in order to obtain the 0 to 10 vdc signal output. There will not be a resistor on a factory-supplied module, but a resistor may be present on a replacement module and must be removed.

The R353 module has a terminal block with 7 connections available for wiring. The 2 right-hand terminals are for the 24 vac and common connections. The next 2 terminals are for the 0 to 10 vdc signal. Consult the wiring label for wire identification if replacing the module. The 3 left-hand terminals are not used for this application.

The S353 module has an LED (light-emitting diode), a set of 4 jumper pins, and 2 potentiometers. The LED will light whenever the module is activated, providing a visual indication of the number of exhaust fans running. The jumper pins are arranged in a square format. Two jumpers are used to determine the mode of operation (direct or reverse). The 2 jumpers must be arranged horizontally for direct action (factory set).

At the top of the module are two potentiometers. The left potentiometer adjusts the **offset**. The right potentiometer adjusts the **differential**. The potentiometers are factory set for a nominal 0 in. wg building pressure.

The **offset** set point is defined as the point at which a module turns off a fan, and is measured in terms of percent of the input signal. For control purposes, 0 offset is at an arbitrary ‘‘floor’’ which is established at 10% of the input signal, or 1 vdc. In this example, the first stage will turn off at 30% (3 vdc), and the offset potentiometer will be set at 20%. The second stage will turn off at 50% signal (5 vdc), and the offset potentiometer will be set at 40%. The fourth stage is at the maximum 75% offset, which equates to 85% signal or 8.5 vdc. The offset potentiometer is calibrated in 10% increments.

Table 11 relates building pressure to signal level.

Table 11 — Potentiometer Signal Levels

BUILDING PRESSURE (in. wg)	SIGNAL LEVEL (vdc)
−0.50	2
−0.25	4
0.00	6
0.25	8
0.50	10

If the building pressure is controlled at 0 in. wg, offset of the first stage should be set at 50%, which equates to 60% of the input signal, or 6 vdc. The other stages can then be set as desired between 50% and 75%.

The default offset set points for modulating power exhaust are shown in Tables 12A and 12B.

The **differential** set point is the difference between the turn off point and the turn on point for each module. It also is calibrated in terms of percent of input signal, and has a range of 1% to 7%. The differential potentiometer is calibrated in 1% increments, and is factory set at approximately 3%. It is recommended to leave the set point at 3%, to minimize cycling of the fans.

The offset and differential potentiometers have been factory set for atmospheric pressure. Do not change these settings until there is some experience with the building. In most cases the factory settings will be satisfactory. However, if the building pressure is not being maintained as desired, then some minor adjusting on a trial and error basis can be made.

Direct Digital Controls DIP Switch Configuration — The Direct Digital Control (DDC) board must be configured for each application. The DDC board is configured through the DIP switches located on the board. There are 8 DIP switches which configure 8 different applications of the DDC. See Table 13. DIP switch 1 is on the left of the block. DIP switch 8 is on the right of the block. To open a DIP switch, push the switch up with suitable tool (small-blade screwdriver). To close a DIP switch, push the switch down. Factory settings are shown in Table 14.

The DIP switch configurations are as follows:

- DIP switch 1 configures the unit to operate as a VAV or CV unit
- DIP switch 2 configures the unit to use a space sensor (VAV units) or a thermostat (CV units)
- DIP switch 3 configures the DDC for use with an electronic expansion board
- DIP switch 4 is used to field test the unit
- DIP switch 5 is used to enable occupied heating (VAV units) or specify the type of power exhaust (CV units)
- DIP switch 6 configures the Time Guard® override and, when used with the field test function, sets the minimum damper position
- DIP switch 7 configures the unit for gas heat or electric heat
- DIP switch 8 configures the unit for heat pump or air conditioner operation.

Crankcase Heater — Units are equipped with crankcase heaters. Crankcase heaters are energized as long as there is power supplied to unit. Crankcase heaters deenergize while compressors are running.

IMPORTANT: To prevent damage to compressors, crankcase heater should be energized 24-hours prior to start-up.

Evaporator Fan — Fan belt and fixed pulleys are factory-installed. See Tables 15-21 for fan performance and motor limitations data. Remove tape from fan pulley, and be sure that fans rotate in the proper direction. See Table 22 for air quantity limits. Static pressure drop for power exhaust is negligible. To alter fan performance, see Evaporator Fan Performance Adjustment section on page 62.

Condenser Fans and Motors — Condenser fans and motors are factory set. Refer to Condenser-Fan Adjustment section on page 63 as required. Be sure that fans rotate in the proper direction. Fan no. 2 (sizes 024-034), fans no. 3 and 4 (sizes 038-054), and fans no. 4, 5, and 6 (sizes 058-068) are cycled on the outdoor-air temperature.

The VFD will always provide the proper phase sequence to the indoor-fan motor to operate in the proper rotation regardless of the phase sequence to the unit. If on start-up, the outdoor fans operate backwards but the indoor fan operates in the correct direction, reverse any two leads to the unit main termiinal block and all fans will operate in the correct direction.

Table 12A — Power Exhaust Default Set Points (Sizes 024-048)

STAGE	OFFSET	DIFFERENTIAL	OFF VOLTAGE	ON VOLTAGE	OFF STATIC PRESSURE (in. wg)
1	50%	3%	6.0	6.3	0.00
2	55%	3%	6.5	6.8	0.06
3	60%	3%	7.0	7.3	0.12
4	64%	3%	7.4	7.7	0.18

Table 12B — Power Exhaust Default Set Points (Sizes 054-068)

STAGE	OFFSET	DIFFERENTIAL	OFF VOLTAGE	ON VOLTAGE	OFF STATIC PRESSURE (in. wg)
1	50%	3%	6.0	6.3	0.00
2	55%	3%	6.5	6.8	0.06
3	60%	3%	7.0	7.3	0.12
4	65%	3%	7.5	7.8	0.19
5	70%	3%	8.0	8.3	0.25
6	75%	3%	8.5	8.8	0.31

Table 13 — DIP Switch Configuration

SETTING	1	2	3	4	5	6	7	8
OPEN	VAV	VAV — Space Sensor Installed	Expansion Board	Field Test ON	VAV — Occupied Heat Enabled	Time Guard® Override ON	Gas Heat	Heat Pump Operation
		CV — CCN or Sensors Used			CV — Modulated Power Exhaust	IN CONJUNCTION WITH FIELD TEST — Set Minimum Damper Position		
CLOSED	CV	VAV — No Space Sensor	Base Control Board Only	Field Test OFF	VAV — Occupied Heat Disabled	Time Guard Override OFF	Electric Heat	Air Conditioner Operation
		CV — Thermostat			CV — Constant Volume Power Exhaust			

LEGEND

CCN — Carrier Comfort Network
CV — Constant Volume
VAV — Variable Air Volume

NOTES:
1. The OPEN side of the DIP switch is marked “OPEN.” When the rocker switch is on the “OPEN” side of the switch, the switch is OPEN.
2. The configuration of DIP switches 2 and 5 are dependent on DIP switch 1. If DIP switch 1 is set to OPEN (VAV operation), then DIP switches 2 and 5 will configure VAV functions.
3. When the unit is field-tested (DIP switch 4 to OPEN), the function of DIP switch 6 changes and it is used to set the minimum damper position.

Table 14 — DIP Switch Factory Settings

UNIT	1	2	3	4	5	6	7	8
48EJ,EW	Closed	Closed	Closed	Closed	Closed	Closed	Open	Closed
48EK,EY	Open	Closed	Closed	Closed	Closed	Closed	Open	Closed

Table 15 — Fan Performance, 48EJ,EK024,034 — Vertical Discharge Units

(For EW,EY units, reduce net available external static pressure by 0.3 in. wg.)

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)															
	0.2		0.4		0.6		0.8		1.0		1.2		1.4		1.6	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
4,000	340	0.83	416	1.17	480	1.52	537	1.90	588	2.29	635	2.69	679	3.11	720	3.53
5,000	384	1.25	453	1.61	513	1.99	566	2.39	615	2.79	660	3.21	703	3.64	742	4.08
6,000	432	1.79	495	2.19	550	2.59	600	3.01	647	3.43	690	3.87	730	4.31	769	4.77
7,000	483	2.48	540	2.91	591	3.33	638	3.77	682	4.22	723	4.67	762	5.14	799	5.61
8,000	536	3.33	588	3.78	635	4.23	679	4.69	720	5.16	759	5.64	797	6.12	832	6.61
8,250	549	3.57	600	4.02	646	4.48	690	4.95	730	5.42	769	5.90	806	6.39	841	6.88
9,000	590	4.34	637	4.82	681	5.30	722	5.78	762	6.27	799	6.77	834	7.27	868	7.77
10,000	645	5.54	689	6.04	729	6.54	768	7.04	805	7.56	840	8.07	874	8.59	906	9.12
11,000	701	6.92	741	7.44	779	7.96	816	8.49	850	9.03	884	9.56	916	10.10	947	10.65
12,000	757	8.49	795	9.04	830	9.59	865	10.14	898	10.69	929	11.25	960	11.81	990	12.37
12,500	786	9.36	822	9.92	856	10.47	890	11.03	922	11.60	953	12.16	983	12.73	1012	13.31
13,000	814	10.28	849	10.84	883	11.41	915	11.98	946	12.56	976	13.13	1006	13.71	1034	14.30
13,750	857	11.75	890	12.34	922	12.92	953	13.51	983	14.10	1012	14.69	1041	15.28	1068	15.88
14,000	871	12.27	904	12.86	936	13.45	966	14.05	996	14.64	1025	15.23	1053	15.83	1080	16.43
15,000	929	14.50	960	15.10	990	15.71	1019	16.33	1047	16.94	1074	17.55	1101	18.17	1127	18.79

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)															
	1.8		2.0		2.2		2.4		2.6		2.8		3.0		3.2	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
4,000	759	3.97	796	4.42	831	4.87	865	5.34	897	5.81	929	6.30	959	6.79	988	7.28
5,000	780	4.53	816	4.99	851	5.45	884	5.93	916	6.41	946	6.90	976	7.40	1005	7.91
6,000	805	5.23	840	5.70	874	6.18	906	6.67	937	7.16	968	7.66	997	8.17	1025	8.69
7,000	834	6.09	868	6.57	901	7.07	932	7.56	962	8.07	992	8.58	1020	9.10	1048	9.63
8,000	866	7.10	899	7.60	930	8.11	961	8.62	990	9.14	1019	9.67	1047	10.20	1074	10.74
8,250	874	7.38	907	7.89	938	8.40	968	8.92	998	9.44	1026	9.97	1054	10.50	1081	11.04
9,000	901	8.29	932	8.80	963	9.33	992	9.86	1021	10.39	1049	10.93	1076	11.48	1102	12.03
10,000	938	9.65	968	10.18	997	10.72	1026	11.27	1054	11.82	1081	12.37	1107	12.93	1133	13.49
11,000	977	11.19	1006	11.75	1035	12.30	1062	12.87	1089	13.43	1115	14.00	1141	14.57	1166	15.15
12,000	1019	12.94	1047	13.51	1074	14.08	1100	14.66	1126	15.24	1152	15.83	1177	16.42	1201	17.01
12,500	1040	13.88	1067	14.46	1094	15.05	1120	15.63	1146	16.22	1171	16.82	1195	17.41	—	—
13,000	1062	14.88	1089	15.47	1115	16.06	1140	16.66	1166	17.25	1190	17.86	—	—	—	—
13,750	1095	16.48	1121	17.08	1147	17.68	1172	18.29	1196	18.90	—	—	—	—	—	—
14,000	1106	17.04	1132	17.64	1157	18.25	1182	18.86	—	—	—	—	—	—	—	—
15,000	1152	19.41	1177	20.04	1200	20.66	—	—	—	—	—	—	—	—	—	—

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)					
	3.4		3.6		3.8	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
4,000	1017	7.79	1045	8.30	1072	8.82
5,000	1033	8.42	1061	8.94	1087	9.46
6,000	1053	9.21	1080	9.73	1106	10.27
7,000	1075	10.16	1102	10.69	1127	11.24
8,000	1100	11.28	1126	11.83	1151	12.38
8,250	1107	11.59	1133	12.14	1158	12.69
9,000	1128	12.58	1153	13.14	1178	13.70
10,000	1158	14.06	1183	14.63	—	—
11,000	1190	15.74	—	—	—	—
12,000	—	—	—	—	—	—
12,500	—	—	—	—	—	—
13,000	—	—	—	—	—	—
13,750	—	—	—	—	—	—
14,000	—	—	—	—	—	—
15,000	—	—	—	—	—	—

LEGEND

Bhp — Brake Horsepower

NOTES:

1. Fan performance is based on wet coils, economizer, roof curb, cabinet losses, and clean 2-in. filters.
2. Conversion — Bhp to watts:

$$\text{Watts} = \frac{\text{Bhp} \times 746}{\text{Motor Efficiency}}$$

3. Variable Air Volume units will operate down to 70 cfm/ton. Performance at 70 cfm/ton is limited to unloaded operation and may be additionally limited by edb and ewb conditions.

Table 16 — Fan Performance, 48EJ,EK038,044 — Vertical Discharge Units

(For EW,EY units, reduce net available external static pressure by 0.5 in. wg)

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)															
	0.2		0.4		0.6		0.8		1.0		1.2		1.4		1.6	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
7,000	429	1.70	484	2.40	536	2.70	584	3.10	630	3.50	674	3.90	716	4.30	756	4.80
8,000	475	2.36	525	3.09	571	3.49	616	3.90	658	4.31	699	4.74	738	5.17	776	5.61
9,000	523	3.11	567	3.97	610	4.39	651	4.82	690	5.26	728	5.71	765	6.16	801	6.62
10,000	571	4.00	612	5.01	651	5.46	689	5.91	725	6.37	761	6.84	795	7.31	829	7.79
11,000	620	5.04	658	6.22	694	6.69	729	7.17	763	7.65	796	8.14	829	8.64	860	9.14
12,000	670	6.24	705	7.61	738	8.10	771	8.60	803	9.11	834	9.62	865	10.13	894	10.65
13,000	720	7.61	752	9.19	784	9.70	814	10.23	844	10.75	874	11.29	902	11.82	931	12.36
14,000	771	9.15	801	10.97	830	11.51	859	12.05	887	12.60	915	13.15	942	13.71	969	14.27
15,000	822	10.88	850	12.95	877	13.52	904	14.08	931	14.65	957	15.22	983	15.80	1008	16.38
16,000	873	12.80	899	15.16	925	15.74	951	16.33	976	16.92	1001	17.51	1025	18.11	1049	18.71
17,000	924	14.91	949	17.59	974	18.20	998	18.80	1022	19.41	1045	20.03	1069	20.64	1092	21.26
18,000	976	17.24	999	20.26	1023	20.88	1046	21.51	1068	22.14	1091	22.77	1113	23.41	1135	24.05
19,000	1027	19.77	1050	23.17	1072	23.82	1094	24.46	1115	25.11	1137	25.76	1158	26.42	1179	27.07
20,000	1079	22.53	1100	26.33	1122	27.00	1142	27.66	1163	28.33	1183	29.00	—	—	—	—

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)															
	1.8		2.0		2.2		2.4		2.6		2.8		3.0		3.2	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
7,000	794	5.20	832	5.62	868	6.06	903	6.52	937	6.98	971	7.44	1003	7.92	1035	8.40
8,000	813	6.06	848	6.52	883	6.98	916	7.45	949	7.92	981	8.40	1012	8.89	1042	9.38
9,000	835	7.09	869	7.56	902	8.04	934	8.53	965	9.02	995	9.52	1025	10.02	1054	10.53
10,000	862	8.28	893	8.77	925	9.27	955	9.77	985	10.28	1014	10.79	1043	11.31	1071	11.84
11,000	891	9.64	921	10.15	951	10.67	980	11.19	1008	11.71	1036	12.24	1064	12.78	1090	13.32
12,000	924	11.18	952	11.71	980	12.24	1008	12.78	1035	13.32	1062	13.87	1088	14.42	1114	14.98
13,000	958	12.91	986	13.45	1012	14.01	1039	14.56	1064	15.13	1090	15.69	1115	16.26	1140	16.83
14,000	995	14.83	1021	15.40	1046	15.97	1071	16.55	1096	17.13	1120	17.71	1144	18.29	1168	18.89
15,000	1033	16.96	1058	17.55	1082	18.14	1106	18.73	1130	19.33	1153	19.93	1176	20.54	1199	21.14
16,000	1073	19.31	1097	19.92	1120	20.52	1143	21.14	1165	21.75	1188	22.37	—	—	—	—
17,000	1114	21.88	1137	22.51	1159	23.13	1181	23.76	—	—	—	—	—	—	—	—
18,000	1156	24.69	1178	25.33	1199	25.98	—	—	—	—	—	—	—	—	—	—
19,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
20,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)					
	3.4		3.6		3.8	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
7,000	1066	8.88	1096	9.38	1125	9.88
8,000	1072	9.88	1101	10.39	1130	10.90
9,000	1083	11.04	1111	11.56	1139	12.08
10,000	1098	12.37	1125	12.90	1152	13.44
11,000	1117	13.86	1143	14.41	1169	14.96
12,000	1139	15.54	1164	16.11	1189	16.68
13,000	1164	17.41	1188	17.99	—	—
14,000	1191	19.48	—	—	—	—
15,000	—	—	—	—	—	—
16,000	—	—	—	—	—	—
17,000	—	—	—	—	—	—
18,000	—	—	—	—	—	—
19,000	—	—	—	—	—	—
20,000	—	—	—	—	—	—

LEGEND

Bhp — Brake Horsepower

NOTES:

1. Fan performance is based on wet coils, economizer, roof curb, cabinet losses, and clean 2-in. filters.
2. Conversion — Bhp to watts:

$$\text{Watts} = \frac{\text{Bhp} \times 746}{\text{Motor Efficiency}}$$

3. Variable Air Volume units will operate down to 70 cfm/ton. Performance at 70 cfm/ton is limited to unloaded operation and may be additionally limited by edb and ewb conditions.

Table 17 — Fan Performance, 48EJ,EK048 — Vertical Discharge Units

(For EW,EY units, reduce net available external static pressure by 0.5 in. wg)

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)															
	0.2		0.4		0.6		0.8		1.0		1.2		1.4		1.6	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
9,000	528	3.20	572	4.00	615	4.40	656	4.90	695	5.30	733	5.80	769	6.20	805	6.70
10,000	577	4.10	617	5.10	657	5.50	694	6.00	731	6.40	766	6.90	801	7.40	834	7.90
11,000	627	5.10	664	6.30	700	6.80	735	7.30	769	7.70	802	8.20	835	8.70	866	9.20
12,000	677	6.30	711	7.70	745	8.20	778	8.70	809	9.20	841	9.70	871	10.20	901	10.80
13,000	728	7.71	760	9.31	791	9.83	822	10.35	851	10.88	881	11.42	909	11.95	938	12.50
14,000	779	9.28	809	11.11	838	11.65	867	12.20	895	12.75	923	13.31	950	13.87	976	14.43
15,000	830	11.03	858	13.13	886	13.69	913	14.26	939	14.83	966	15.41	991	15.99	1017	16.57
16,000	882	12.97	908	15.36	934	15.95	960	16.54	985	17.13	1010	17.73	1034	18.33	1058	18.93
17,000	934	15.12	959	17.83	983	18.44	1008	19.05	1031	19.66	1055	20.28	1078	20.89	1101	21.52
18,000	986	17.47	1010	20.53	1033	21.16	1056	21.79	1078	22.42	1101	23.06	1123	23.70	1145	24.34
19,000	1038	20.05	1061	23.49	1083	24.13	1105	24.78	1126	25.44	1147	26.09	1169	26.75	1190	27.41
20,000	1091	22.84	1112	26.69	1133	27.36	1154	28.03	1174	28.70	1195	29.37	—	—	—	—

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)															
	1.8		2.0		2.2		2.4		2.6		2.8		3.0		3.2	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
9,000	839	7.10	873	7.62	905	8.10	937	8.59	968	9.08	999	9.57	1028	10.08	1057	10.58
10,000	866	8.40	898	8.85	929	9.34	959	9.85	989	10.36	1018	10.87	1047	11.39	1075	11.91
11,000	897	9.70	927	10.24	956	10.76	985	11.28	1013	11.81	1041	12.34	1068	12.87	1095	13.41
12,000	930	11.30	958	11.82	986	12.36	1014	12.90	1041	13.44	1067	13.99	1093	14.54	1119	15.10
13,000	965	13.04	992	13.59	1019	14.15	1045	14.71	1071	15.27	1096	15.84	1121	16.41	1146	16.98
14,000	1002	14.99	1028	15.56	1054	16.14	1079	16.71	1103	17.30	1127	17.88	1151	18.47	1175	19.06
15,000	1041	17.15	1066	17.74	1090	18.34	1114	18.93	1138	19.53	1161	20.13	1184	20.74	—	—
16,000	1082	19.52	1105	20.14	1128	20.75	1151	21.37	1174	21.99	1196	22.61	—	—	—	—
17,000	1124	22.14	1146	22.77	1168	23.40	1190	24.03	—	—	—	—	—	—	—	—
18,000	1166	24.98	1188	25.63	—	—	—	—	—	—	—	—	—	—	—	—
19,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
20,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)					
	3.4		3.6		3.8	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
9,000	1086	11.10	1114	11.61	1141	12.14
10,000	1102	12.44	1129	12.97	1155	13.51
11,000	1122	13.96	1147	14.51	1173	15.06
12,000	1144	15.66	1169	16.23	1194	16.80
13,000	1170	17.56	1194	18.14	—	—
14,000	1198	19.66	—	—	—	—
15,000	—	—	—	—	—	—
16,000	—	—	—	—	—	—
17,000	—	—	—	—	—	—
18,000	—	—	—	—	—	—
19,000	—	—	—	—	—	—
20,000	—	—	—	—	—	—

LEGEND

Bhp — Brake Horsepower

NOTES:

1. Fan performance is based on wet coils, economizer, roof curb, cabinet losses, and clean 2-in. filters.
2. Conversion — Bhp to watts:

$$\text{Watts} = \frac{\text{Bhp} \times 746}{\text{Motor Efficiency}}$$

3. Variable Air Volume units will operate down to 70 cfm/ton. Performance at 70 cfm/ton is limited to unloaded operation and may be additionally limited by edb and ewb conditions.

Table 18 —Fan Performance, 48EJ,EK054-068 — Vertical Discharge Units

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)															
	0.2		0.4		0.6		0.8		1.0		1.2		1.4		1.6	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
10,000	420	2.89	486	3.60	539	4.27	584	4.93	624	5.59	660	6.25	694	6.91	725	7.57
12,000	473	4.27	537	5.10	589	5.87	633	6.62	673	7.36	709	8.10	742	8.83	773	9.56
15,000	556	7.05	616	8.06	666	8.99	709	9.89	748	10.76	783	11.62	816	12.47	846	13.31
16,000	584	8.18	643	9.25	692	10.24	735	11.19	773	12.11	808	13.01	841	13.90	871	14.78
17,000	612	9.42	670	10.56	718	11.60	760	12.60	799	13.56	833	14.51	866	15.44	896	16.36
18,000	640	10.78	697	11.98	745	13.08	786	14.12	824	15.13	859	16.12	891	17.10	921	18.06
19,000	669	12.26	724	13.51	771	14.67	813	15.77	850	16.83	884	17.86	916	18.87	946	19.88
20,000	698	13.86	752	15.17	798	16.38	839	17.53	876	18.64	910	19.72	942	20.78	972	21.82
21,000	726	15.58	780	16.96	825	18.22	866	19.42	902	20.58	936	21.71	968	22.81	997	23.89
22,000	756	17.44	808	18.87	853	20.19	892	21.45	929	22.65	962	23.82	993	24.97	1023	26.10
23,000	785	19.43	836	20.92	880	22.30	919	23.60	955	24.86	988	26.08	1019	27.27	1049	28.44
24,000	814	21.56	864	23.11	907	24.54	946	25.90	982	27.20	1015	28.47	1045	29.70	1074	30.91
25,000	843	23.83	892	25.44	935	26.92	973	28.33	1008	29.68	1041	31.00	1072	32.28	1100	33.53
26,000	873	26.25	921	27.91	963	29.45	1001	30.91	1035	32.31	1068	33.67	1098	35.00	1127	36.29
27,000	903	28.82	950	30.53	991	32.12	1028	33.63	1062	35.09	1094	36.49	1124	37.86	1153	39.21

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)															
	1.8		2.0		2.2		2.4		2.6		2.8		3.0		3.2	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
10,000	755	8.24	783	8.92	809	9.60	835	10.29	859	10.98	883	11.68	905	12.39	927	13.10
12,000	802	10.30	830	11.04	857	11.78	882	12.52	906	13.27	930	14.03	953	14.79	974	15.55
15,000	875	14.15	903	14.99	929	15.83	954	16.67	978	17.51	1002	18.35	1024	19.19	1046	20.04
16,000	900	15.65	927	16.53	954	17.40	979	18.27	1003	19.14	1026	20.01	1048	20.89	1070	21.76
17,000	925	17.27	952	18.18	978	19.09	1003	19.99	1027	20.90	1050	21.80	1072	22.70	1094	23.61
18,000	950	19.01	977	19.95	1003	20.90	1028	21.84	1051	22.77	1075	23.71	1097	24.64	1118	25.58
19,000	975	20.87	1002	21.85	1028	22.83	1052	23.80	1076	24.77	1099	25.74	1121	26.71	1143	27.67
20,000	1000	22.85	1027	23.87	1052	24.89	1077	25.90	1101	26.90	1124	27.90	1146	28.90	1167	29.90
21,000	1025	24.96	1052	26.02	1077	27.07	1102	28.12	1126	29.16	1148	30.19	1170	31.23	1192	32.26
22,000	1051	27.21	1077	28.31	1103	29.40	1127	30.48	1151	31.55	1173	32.62	1195	33.69	—	—
23,000	1076	29.59	1103	30.73	1128	31.85	1152	32.97	1176	34.08	1198	35.19	—	—	—	—
24,000	1102	32.11	1128	33.28	1153	34.45	1178	35.61	1201	36.75	—	—	—	—	—	—
25,000	1128	34.77	1154	35.99	1179	37.19	—	—	—	—	—	—	—	—	—	—
26,000	1154	37.57	1180	38.83	—	—	—	—	—	—	—	—	—	—	—	—
27,000	1180	40.53	—	—	—	—	—	—	—	—	—	—	—	—	—	—

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)					
	3.4		3.6		3.8	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
10,000	949	13.81	970	14.54	990	15.26
12,000	996	16.31	1016	17.09	1037	17.86
15,000	1067	20.88	1088	21.73	1108	22.59
16,000	1091	22.64	1112	23.52	1131	24.40
17,000	1115	24.51	1136	25.42	1156	26.33
18,000	1139	26.51	1160	27.45	1180	28.39
19,000	1164	28.64	1184	29.60	—	—
20,000	1188	30.90	—	—	—	—
21,000	—	—	—	—	—	—
22,000	—	—	—	—	—	—
23,000	—	—	—	—	—	—
24,000	—	—	—	—	—	—
25,000	—	—	—	—	—	—
26,000	—	—	—	—	—	—
27,000	—	—	—	—	—	—

LEGEND

Bhp — Brake Horsepower

NOTES:
1. Fan performance is based on dry coils, economizer, roof curb, cabinet losses, and clean 2-in. filters.
2. Conversion — Bhp to watts:

$$\text{Watts} = \frac{\text{Bhp} \times 746}{\text{Motor Efficiency}}$$

3. Variable air volume units will operate down to 70 cfm/ton in the cooling mode. Performance at 70 cfm/ton is limited to unloaded operation and may be additionally limited by edb and ewb conditions.

Table 19 — Fan Performance, 48EW,EY054-068 — Horizontal Discharge Units

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)															
	0.2		0.4		0.6		0.8		1.0		1.2		1.4		1.6	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
10,000	447	2.9	508	3.6	558	4.2	601	4.8	640	5.4	675	6.0	707	6.6	738	7.3
12,000	509	4.4	567	5.1	615	5.8	657	6.5	695	7.2	729	7.9	761	8.6	791	9.3
15,000	606	7.3	659	8.2	704	9.0	744	9.9	780	10.7	813	11.5	844	12.2	874	13.0
16,000	639	8.5	690	9.4	734	10.3	773	11.2	809	12.0	842	12.9	873	13.7	902	14.5
17,000	672	9.8	721	10.8	765	11.7	803	12.6	838	13.5	871	14.4	901	15.3	930	16.1
18,000	705	11.2	753	12.3	795	13.3	833	14.2	868	15.1	900	16.1	930	17.0	959	17.8
19,000	738	12.8	785	13.9	826	14.9	864	15.9	898	16.9	929	17.8	959	18.8	987	19.7
20,000	772	14.5	817	15.6	858	16.7	894	17.7	928	18.8	959	19.7	989	20.7	1016	21.7
21,000	806	16.3	850	17.5	889	18.6	925	19.7	958	20.8	989	21.8	1018	22.8	1046	23.8
22,000	840	18.3	883	19.5	921	20.7	956	21.8	989	22.9	1019	24.0	1048	25.0	1075	26.1
23,000	874	20.4	915	21.7	953	22.9	987	24.1	1019	25.2	1049	26.3	1078	27.4	1105	28.5
24,000	908	22.7	948	24.0	985	25.3	1019	26.5	1050	27.6	1080	28.8	1108	29.9	1135	31.0
25,000	942	25.1	982	26.5	1018	27.8	1051	29.0	1082	30.2	1111	31.4	1138	32.6	1165	33.7
26,000	976	27.7	1015	29.1	1050	30.4	1083	31.7	1113	33.0	1142	34.2	1169	35.4	1195	36.6
27,000	1011	30.4	1048	31.9	1083	33.2	1115	34.6	1145	35.9	1173	37.1	1200	38.4	—	—

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)															
	1.8		2.0		2.2		2.4		2.6		2.8		3.0		3.2	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
10,000	766	7.9	794	8.50	820	9.13	844	9.76	868	10.40	891	11.04	914	11.69	935	12.34
12,000	820	9.9	847	10.62	872	11.30	897	11.99	921	12.68	943	13.37	965	14.07	987	14.77
15,000	901	13.8	928	14.59	953	15.36	977	16.14	1001	16.92	1023	17.69	1045	18.47	1066	19.26
16,000	929	15.3	955	16.14	981	16.95	1005	17.75	1028	18.56	1050	19.37	1072	20.18	1093	20.98
17,000	957	17.0	983	17.81	1008	18.65	1032	19.49	1055	20.33	1077	21.16	1099	22.00	1120	22.84
18,000	986	18.7	1011	19.60	1036	20.48	1060	21.35	1083	22.22	1105	23.08	1126	23.95	1147	24.82
19,000	1014	20.6	1040	21.53	1064	22.43	1088	23.34	1110	24.24	1132	25.14	1154	26.03	1174	26.93
20,000	1043	22.6	1068	23.58	1092	24.52	1116	25.46	1138	26.39	1160	27.32	1181	28.25	—	—
21,000	1072	24.8	1097	25.78	1121	26.75	1144	27.72	1167	28.68	1188	29.64	—	—	—	—
22,000	1101	27.1	1126	28.11	1150	29.12	1173	30.12	1195	31.11	—	—	—	—	—	—
23,000	1130	29.5	1155	30.58	1179	31.62	—	—	—	—	—	—	—	—	—	—
24,000	1160	32.1	1184	33.20	—	—	—	—	—	—	—	—	—	—	—	—
25,000	1190	34.9	—	—	—	—	—	—	—	—	—	—	—	—	—	—
26,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
27,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

AIRFLOW (cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)					
	3.4		3.6		3.8	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
10,000	956	12.99	976	13.66	996	14.32
12,000	1008	15.48	1028	16.19	1047	16.90
15,000	1087	20.04	1106	20.82	1126	21.61
16,000	1113	21.80	1133	22.61	1152	23.42
17,000	1140	23.68	1160	24.52	1179	25.36
18,000	1167	25.68	1187	26.55	—	—
19,000	1195	27.82	—	—	—	—
20,000	—	—	—	—	—	—
21,000	—	—	—	—	—	—
22,000	—	—	—	—	—	—
23,000	—	—	—	—	—	—
24,000	—	—	—	—	—	—
25,000	—	—	—	—	—	—
26,000	—	—	—	—	—	—
27,000	—	—	—	—	—	—

LEGEND

Bhp — Brake Horsepower

NOTES:
1. Fan performance is based on dry coils, economizer, roof curb, cabinet losses, and clean 2-in. filters.
2. Conversion — Bhp to watts:

$$\text{Watts} = \frac{\text{Bhp} \times 746}{\text{Motor Efficiency}}$$

3. Variable air volume units will operate down to 70 cfm/ton in the cooling mode. Performance at 70 cfm/ton is limited to unloaded operation and may be additionally limited by edb and ewb conditions.

Table 20A — Fan Performance — Power Exhaust, 48EJ,EK,EW,EY024-048

AIRFLOW (Cfm)	LOW SPEED						MEDIUM SPEED						HIGH SPEED					
	208 v			230, 460, 575 v			208 v			230, 460, 575 v			208 v			230, 460, 575 v		
	ESP	Bhp	Watts	ESP	Bhp	Watts	ESP	Bhp	Watts	ESP	Bhp	Watts	ESP	Bhp	Watts	ESP	Bhp	Watts
6,500	0.32	2.82	3160	0.70	2.98	3340	—	—	—	—	—	—	—	—	—	—	—	—
6,700	0.23	2.87	3220	0.63	3.03	3400	0.60	3.01	3380	0.82	3.23	3620	—	—	—	—	—	—
6,900	0.17	2.92	3270	0.59	3.09	3460	0.55	3.07	3440	0.78	3.28	3680	—	—	—	—	—	—
7,100	0.13	2.93	3290	0.56	3.11	3490	0.49	3.12	3500	0.73	3.34	3740	—	—	—	—	—	—
7,300	0.09	2.97	3330	0.53	3.15	3530	0.43	3.18	3560	0.68	3.39	3800	—	—	—	—	—	—
7,500	—	—	—	0.51	3.19	3580	0.39	3.24	3630	0.64	3.44	3860	—	—	—	—	—	—
7,700	—	—	—	0.48	3.23	3620	0.33	3.27	3670	0.59	3.48	3900	0.60	3.69	4140	0.73	3.98	4460
7,900	—	—	—	0.45	3.27	3670	0.27	3.32	3720	0.54	3.52	3950	0.56	3.74	4190	0.69	4.02	4510
8,100	—	—	—	0.40	3.33	3730	0.22	3.36	3770	0.49	3.57	4000	0.51	3.78	4240	0.65	4.07	4560
8,500	—	—	—	—	—	—	0.17	3.47	3890	0.40	3.67	4120	0.41	3.83	4290	0.56	4.12	4620
8,900	—	—	—	—	—	—	0.00	3.58	4010	0.30	3.77	4230	0.31	3.93	4410	0.47	4.23	4740
9,300	—	—	—	—	—	—	—	—	—	0.22	3.87	4340	0.20	4.07	4560	0.37	4.37	4900
9,700	—	—	—	—	—	—	—	—	—	0.16	3.95	4430	0.11	4.17	4670	0.30	4.47	5010
10,100	—	—	—	—	—	—	—	—	—	0.12	4.03	4520	0.04	4.25	4770	0.23	4.56	5110
10,500	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.17	4.66	5220
10,900	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.12	4.75	5330
11,300	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.07	4.80	5380
11,700	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.04	4.83	5420

LEGEND

Bhp — Brake Horsepower
ESP — External Static Pressure (in. wg)
Watts — Input Watts to Motor

Table 20B — Fan Performance — Power Exhaust, 48EJ,EK,EW,EY054-068

AIRFLOW (Cfm)	LOW SPEED						MEDIUM SPEED						HIGH SPEED					
	208 v			230, 460, 575 v			208 v			230, 460, 575 v			208 v			230, 460, 575 v		
	ESP	Bhp	Watts	ESP	Bhp	Watts	ESP	Bhp	Watts	ESP	Bhp	Watts	ESP	Bhp	Watts	ESP	Bhp	Watts
9,750	0.32	4.23	4740	0.70	4.47	5010	—	—	—	—	—	—	—	—	—	—	—	—
10,050	0.23	4.31	4830	0.63	4.55	5100	0.60	4.52	5070	0.82	4.84	5430	—	—	—	—	—	—
10,350	0.17	4.37	4905	0.59	4.63	5190	0.55	4.60	5160	0.78	4.92	5520	—	—	—	—	—	—
10,650	0.13	4.40	4935	0.56	4.67	5235	0.49	4.68	5250	0.73	5.00	5610	—	—	—	—	—	—
10,950	0.09	4.46	4995	0.53	4.72	5295	0.43	4.76	5340	0.68	5.08	5700	—	—	—	—	—	—
11,250	—	—	—	0.51	4.79	5370	0.39	4.86	5445	0.64	5.16	5790	—	—	—	—	—	—
11,550	—	—	—	0.48	4.84	5430	0.33	4.91	5505	0.59	5.22	5850	0.60	5.54	6210	0.73	5.97	6690
11,850	—	—	—	0.45	4.91	5505	0.27	4.98	5580	0.54	5.28	5925	0.56	5.61	6285	0.69	6.03	6765
12,150	—	—	—	0.40	4.99	5595	0.22	5.04	5655	0.49	5.35	6000	0.51	5.67	6360	0.65	6.10	6840
12,750	—	—	—	—	—	—	0.17	5.20	5835	0.40	5.51	6180	0.41	5.74	6435	0.56	6.18	6930
13,350	—	—	—	—	—	—	0.00	5.36	6015	0.30	5.66	6345	0.31	5.90	6615	0.47	6.34	7110
13,950	—	—	—	—	—	—	—	—	—	0.22	5.81	6510	0.20	6.10	6840	0.37	6.56	7350
14,550	—	—	—	—	—	—	—	—	—	0.16	5.93	6645	0.11	6.25	7005	0.30	6.70	7515
15,150	—	—	—	—	—	—	—	—	—	0.12	6.05	6780	0.04	6.38	7155	0.23	6.84	7665
15,750	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.17	6.98	7830
16,350	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.12	7.13	7995
16,950	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.07	7.20	8070
17,550	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.04	7.25	8130

LEGEND

Bhp — Brake Horsepower
ESP — External Static Pressure (in. wg)
Watts — Input Watts to Motor

Table 21 — Motor Limitations

STANDARD EFFICIENCY MOTORS						
Nominal Bhp	Maximum Bhp	Maximum Amps			Maximum Watts	Maximum Efficiency
		230 v	460 v	575 v		
5	5.9	14.6	7.9	6.0	5,030	87.5
7.5	8.7	22.0	—	—	7,717	84.1
	9.5	—	12.0	10.0	8,008	88.5
10	10.2	28.0	—	—	8,502	89.5
	11.8	—	14.6	12.0	9,836	89.5
15	15.3	43.8	—	–	12,543	91.0
	18.0	—	21.9	19.0	14,756	91.0
20	22.4	62.0	—	—	18,363	91.0
	23.4	—	28.7	23.0	19,183	91.0
25	28.9	72.0	—	—	23,511	91.7
	29.4	—	37.4	31.0	23,918	91.7
30	35.6	95.0	—	—	28,742	92.4
	34.7	—	48.0	47.0	28,015	92.4
40	42.0	110.0	55.0	48.8	33,690	93.0

HIGH EFFICIENCY MOTORS					
Nominal Bhp	Maximum Bhp	Maximum Amps		Maximum Watts	Maximum Efficiency
		230 v	460 v		
5	5.9	15.8	7.9	4,918	89.5
7.5	8.7	22.0	—	7,078	91.7
	9.5	—	12.0	7,728	91.7
10	10.2	28.0	—	8,298	91.7
	11.8	—	15.0	9,600	91.7
15	15.3	43.8	—	12,273	93.0
	18.0		21.9	14,439	93.0
20	22.4	58.2	—	17,853	93.6
	23.4	—	28.7	18,650	93.6
25	28.9	73.0	—	23,034	93.6
	29.4	—	36.3	23,432	93.6
30	35.6	82.6	—	28,374	93.6
	34.7	—	41.7	27,656	93.6
40	42.0	110.0	55.0	33,156	94.5

LEGEND

Bhp — Brake Horsepower

NOTES:

1. Extensive motor and electrical testing on the Carrier units has ensured that the full horsepower range of the motor can be utilized with confidence. Using your fan motors up to the horsepower ratings shown in the Motor Limitations table will not result in nuisance tripping or premature motor failure. Unit warranty will not be affected.
2. All motors comply with Energy Policy Act (EPACT) Standards effective October 24, 1997.

Table 22 — Air Quality Limits

UNIT 48EJ,EK,EW,EY	MINIMUM HEATING AIRFLOW (Low Heat)	MINIMUM HEATING AIRFLOW (High Heat)	MINIMUM COOLING AIRFLOW (VAV) AT FULL LOAD OPERATION	MINIMUM COOLING AIRFLOW (CV)	MAXIMUM AIRFLOW
024	5,900	6,100	4,000	6,000	10,000
028	5,900	6,100	5,000	7,500	12,500
030	5,900	6,100	5,400	8,100	13,500
034	5,900	6,100	6,000	9,000	15,000
038	7,600	10,100	7,000	10,500	17,500
044	7,600	10,100	8,000	12,000	20,000
048	7,600	10,100	9,000	13,500	22,500
054	11,000	14,700	10,000	15,000	25,000
058	11,000	14,700	11,000	16,500	27,000
064	11,000	14,700	12,000	18,000	27,000
068	11,000	14,700	13,000	19,500	27,000

LEGEND

CV — Constant Volume
edb — Entering Dry Bulb
ewb — Entering Wet Bulb
VAV — Variable Air Volume

NOTE: Variable Air Folume units will operate down to 70 cfm/ton in Cooling mode. Performance at 70 cfm/ton is limited to unloaded operation and may be additionally limited to edb and ewb conditions.

Return-Air Filters — Check that correct filters are installed in filter tracks (see Table 1). Do not operate unit without return-air filters.

Filter Replacement — To replace filters, open filter access door (marked with label). Remove inner access panel. Remove plastic filter retainer in between filter tracks by sliding and pulling outward. Remove first filter by sliding it out of the opening in filter track. Locate filter removal tool, which is shipped next to the return air dampers. Use the filter removal tool to remove the rest of the filters.

Outdoor-Air Inlet Screens — Outdoor-air inlet screens must be in place before operating unit.

Economizer Adjustment — Remove filter access panel. Check that outdoor-air damper is closed and return-air damper is open.

Economizer operation and adjustment are described in Sequence of Operation section on this page; and Minimum Damper Position Setting section on page 35.

Gas Heat — Verify gas pressures before turning on heat as follows:

1. Turn off field-supplied manual gas stop, located external to unit.
2. Connect pressure gage to supply gas tap, located on field-supplied manual shutoff valve (see Fig. 17 on page 20).
3. Connect pressure gage to manifold pressure tap on unit gas valve.
4. Supply gas pressure must not exceed 13.5 in. wg. Check pressure at field-supplied shut-off valve.
5. Turn on manual gas stop and initiate a heating demand. Jumper R to W1 in the control box to initiate heat. On VAV units, the RAT (Return-Air Temperature) must be less than or equal to 68 F for heating to be energized. Use the field test procedure to verify heat operation. After the unit has run for several minutes, verify that incoming pressure is 5.0 in. wg or greater, and that the manifold pressure is 3.5 in. wg. If manifold pressure must be adjusted, refer to Gas Valve Adjustment section on page 64.

Sequence of Operation

NOTE: Unit is shipped with default values that can be changed through Service Tool, Building Supervisor, or ComfortWorks™ software or using an accessory LID-2B. See Table 23 for default values.

COOLING, CONSTANT VOLUME (CV) UNITS — On power up, the control module will activate the initialization software of the control board. The initialization software then reads DIP switch no. 1 position to determine CV or VAV operation. Next, DIP switch no. 2 is read to determine if the control is thermostat or sensor type operation. If switch 2 is open,then sensors are employed. If switch no. 2 is closed, thermostat is employed. Initialization clears all alarms and alerts, remaps the input/output database for CV operation, sets maximum heat stages to 2, and sets maximum cool stages to 3. The control reads DIP switch no. 3 and if open, then it sets the internal flag for expansion mode operation.

The first time power is sent to the control board after a power outage, power up takes 5 minutes plus a random 1 to 63 seconds.

The TSTAT function performs a thermostat based control by monitoring Y1, Y2, W1, W2, and G inputs. These functions control stages cool1, cool2, heat1, heat2, and indoor fan, respectively. If TSTAT function is NOT selected, the control determines the occupancy state on the Time Schedules or with remote occupied/unoccupied input. If temperature compensated start is active, the unit will be controlled as in the Occupied mode. User-defined set points are shown in Table 23.

Table 24 lists the software link points addressable by Dataport and Datalink, Carrier devices that allow access to unit control by non-Carrier energy management systems.

The occupied or unoccupied comfort set points must be selected and the space temperature offset input will be used, if present. The Occupied Heat set point default value is 68 F. The Occupied Cool set point default value is 78 F. The Unoccupied Heat set point default value is 55 F. The Unoccupied Cool set point value is 90 F. The control board will set appropriate operating mode and fan control. The control board will turn on indoor fan, if in Occupied mode, or determine if unit is in Unoccupied mode and the space temperature is outside of the unoccupied comfort set points, (Unoccupied Heat or Unoccupied Cool).

The control board will then monitor space temperature against comfort set points and control heating or cooling stages as required. If system is in the Occupied mode, the economizer will operate as required. If the system is in Unoccupied mode, the system will perform nighttime free cool and IAQ (indoor air quality) pre-occupancy purge as required (when functions are enabled via software). Whenever the DX (direct expansion) cooling is requested, the outdoor fan will operate.

The control board will operate economizer, run diagnostics to monitor alarms/alerts at all times, and respond to CCN communications to perform any configured network POC (product outboard control) functions such as time and outdoor-air temperature broadcast and Global occupancy broadcast. When the optional expansion I/O board is employed, it will: perform periodic scan and maintain database of expanded I/O points, perform Fire/Smoke control (power exhaust required); and if in Occupied mode perform IAQ control and monitor fan, filter, demand limit, and field-applied status (with accessories).

If thermostats are used to energize the G input, the control will turn on indoor fan without delay and open economizer dampers to minimum position.

If thermostats are used to deenergize the G input, the control board will turn off indoor fan without any delay and close economizer dampers.

When cooling, G must be energized before cooling can operate. The control board determines if outdoor conditions are suitable for economizer cooling using the standard outdoor air thermistor. For economizer to function for free cooling, the enthalpy must be low, the outdoor air must equal to or less than the High Outdoor Air Temperature Lockout (default is 65 F), the SAT (supply-air temperature) thermistor is NOT in alarm, and outdoor air reading is available. When these conditions are satisfied, the control board will use economizer as the first stage of cooling.

When Y1 input is energized, the economizer will be modulated to maintain SAT at the defined set point. The default is 55 F. When SAT is above the set point, the economizer will be 100% open. When SAT is below the set point, the economizer will modulate between minimum and 100% open position. When Y2 is energized, the control will turn on compressor no. 1 and continue to modulate economizer as described above. If the Y2 remains energized and the SAT reading remains above the set point for 15 minutes, compressor no. 2 will turn on. If Y2 is deenergized at any time, only the last stage of compression that was energized will be turned off. If outdoor conditions are not suitable for economizer cooling, the economizer will go to minimum position and cycle compressor no. 1 and 2 based on demand from Y1 and Y2 respectively. The compressors will be locked out when the SAT temperature is too low (less than 40 F for compressor no. 1 and less than 45 F for compressor no. 2.) After a compressor is locked out, it can restart after normal time guard period.

Table 23 — User Defined Set Points

SET POINT NAME	FORMAT	DESCRIPTION	LIMITS	DEFAULT
OHSP	xx.xF	Occupied Heat Set Point	55 to 80 F	68 F
OCSP	xx.xF	Occupied Cool Set Point	55 to 80 F	78 F
UHSP	xx.xF	Unoccupied Heat Set Point	40 to 80 F	55 F
UCSP	xx.xF	Unoccupied Cool Set Point	75 to 95 F	90 F
SASP	xx.xF	Supply Air Set Point	45 to 70 F	55 F
OATL	xx.xF	Hi OAT Lockout Temperature	55 to 75 F	65 F
NTLO	xx.xF	Unoccupied OAT Lockout Temperature	40 to 70 F	50 F
RTIO	xx.x	Reset Ratio	0 to 10	3
LIMT	xx.xF	Reset Limit	0 to 20° F	10° F
MDP	xxx%	Minimum Damper Position	0 to 100%	20%
LOWMDP	xxx%	Low Temperature Minimum Damper Position Override	0 to 100%	100%
IAQS	xxxx	IAQ Set Point	1 to 5000 PPM	650 PPM
UHDB	xx.xF	Unoccupied Heating Deadband	0 to 10° F	1° F
UCDB	xx.xF	Unoccupied Cooling Deadband	0 to 10° F	1° F
LTMP	xxx%	Low Temp. Min. Position	0 to 100%	10%
HTMP	xxx%	High Temp. Min. Position	0 to 100%	35%
PES1	xxx%	CV Power Exhaust Stage 1 Point	0 to 100%	25%
PES2	xxx%	CV Power Exhaust Stage 2 Point	0 to 100%	75%

LEGEND
CV — Constant Volume
IAQ — Indoor Air Quality
OAT — Outdoor-Air Temperature

Table 24 — Software Control Link Points

SET POINT	DESCRIPTION	SET POINT	DESCRIPTION
		CV Data	
SPT	Space Temperature	**HS2**	Heat Stage 2
SAT	Supply-Air Temperature	**STO**	Space Temp. Offset
RAT	Return-Air Temperature	**CVPE1**	CV Power Exhaust Stg 1
OAT	Outside-Air Temperature	**CVPE2**	CV Power Exhaust Stg 2
CLSP	Control Set Point	**VAV Data**	
CCAP	Cooling % Total Capacity	**HIR**	Heat Interlock Relay
HCAP	Heating % Total Capacity	**SPTRESET**	Space Temp. Reset
ECOS	Economizer Active	**CMP1**	Compressor 1
SFSTAT	Supply Fan Status	**CMP1SAFE**	Compressor 1 Safety
SF	Fan Relay	**CMP2**	Compressor 2
ECONPOS	Economizer Position	**CMP2SAFE**	Compressor 2 Safety
IQMP	Min. Damper Position	**ULD1**	Unloader 1
PEXE	Power Exhaust Enable	**ULD2**	Unloader 2
FLTS	Filter Status	**OFC1**	Outdoor Fan 1
FAS	Field Applied Status	**OFC2**	Outdoor Fan 2
RMTOCC	Remote Occupied Mode	**Y1**	Y1 — Call for Cool 1
General Data		**Y2**	Y2 — Call for cool 2
HS1	Heat Stage 1	**W1**	W1 — Call for Heat 1
ENTH	Enthalpy	**W2**	W2 — Call for Heat 2
IAQI	Indoor Air Quality	**G**	G — Call for Fan
IAQO	Outdoor Air Quality	**CDEVCODE**	CONQUEST DEVICE CODE
SATRES	SAT Reset	**CDEVURST**	CONQUEST UNIT RESET
ALMLIGHT	Alarm Warning Light	**CDEVBCAK**	CONQUEST BROADCAST ACK
DL	Demand Limit Switch	**PE1**	Mod. Power Exhaust Stg 1
EVAC	Evacuation	**PE2**	Mod. Power Exhaust Stg 2
PRES	Pressurization	**PE3**	Mod. Power Exhaust Stg 3
PURG	Smoke Purge	**PE4**	Mod. Power Exhaust Stg 4
FSD	Fire Shutdown	**PE5**	Mod Power Exhaust Stg 5
		PE6	Mod Power Exhaust Stg 6

LEGEND
CV — Constant Volume
VAV — Variable Air Volume

The Time Guard® function maintains a minimum off time of 5 minutes, a minimum ON time of 10 seconds, and a minimum delay before starting the second compressor of 10 seconds.

When heating, the heat stages respond to the demand from W1 and W2 of the thermostat input. Heating and cooling will be mutually locked out on demand on a first call basis. The heating and the cooling functions cannot be operating simultaneously.

COOLING, VARIABLE AIR VOLUME (VAV) UNITS — On power up, the control module will activate the initialization software of the control board. The initialization software then reads DIP switch no. 1 position to determine CV or VAV operation. Initialization clears all alarms and alerts, re-maps the input/output database for VAV operation, sets maximum heat stages to 1 and sets maximum cool stages to 6. The control reads DIP switch no. 3 and if open, then it sets the internal flag for expansion mode operation.

The control module will determine if an interface (linkage) is active and if the unit will operate in a Digital Air Volume (DAV) mode. In a DAV system, the room terminals are equipped with microprocessor controls that give commands to the base unit module. If an interface is active, the control will replace local comfort set points, space and return air temperatures and occupancy status with the linkage data supplied.

The control module will determine occupancy status from Time Schedules (if programmed), Remote Occupied/Unoccupied input, global occupancy, or DAV. If temperature compensated start is active, the unit will be controlled as in the Occupied mode.

NOTE: The temperature compensated start is a period of time calculated to bring the unit on while unoccupied to reach the occupied set point when occupancy occurs.

The control module will set the appropriate operating mode and fan control. The control module will turn VFD on if Occupied mode is evident.

For units equipped with a start/stop switch only (no space temperature sensor), if unoccupied and valid return-air temperature reading is available (either from a sensor or DAV), the control will monitor return-air temperature against Unoccupied Heat and Cool set points.

For units with a start/stop switch and a space temperature sensor, the control module will start the VFD whenever SPT is outside of the set points (Unoccupied Heat or Unoccupied Cool). The VFD may also be started by nighttime thermostat via remote Occupied/Unoccupied input or by a temperature compensated start algorithm. When VFD is running in a normal mode, the control will start heating or cooling as required to maintain supply-air temperature at the supply air set point plus the reset (when enabled). The reset value is determined by SAT (supply-air temperature) reset and/or space temperature reset algorithms. The space temperature reset is only available when enabled through software.

When cooling, the control will energize the power exhaust enable output to the external power exhaust controller, when power exhaust is used.

If occupied, the control will perform economizer control (economizer control same as described above for CV units). If unoccupied, the control will perform nighttime free cool and IAQ pre-occupancy purge as required (when enabled through software). When DX (direct expansion) cooling is called, the outdoor fans will always operate.

The control will run continuous diagnostics for alarms/alerts; respond to CCN communications and perform any configured network POC (product outboard controls) functions such as time and outdoor-air temperature broadcast and global broadcast; and perform Fire/Smoke control if equipped with power exhaust.

GAS HEATING, CONSTANT VOLUME (CV) UNITS — The gas heat units incorporate 2 (sizes 024-048) or 3 (sizes 054-068) separate systems to provide gas heat. Each system incorporates its own induced-draft motor, Integrated Gas Control (IGC) board, 2 stage gas valve, manifold, etc. The systems are operated in parallel; for example, when there is a call for first stage heat, all induced-draft motors operate, all gas valves are energized, and both IGC boards initiate spark.

All of the gas heating control is performed through the IGC boards (located in the heating section). The base module board serves only to initiate and terminate heating operation.

The base module board is powered by 24 vac. When the thermostat or room sensor calls for heating, power is sent from the base module board to W on each of the IGC boards. An LED on the IGC board will be on during normal operation. A check is made to ensure that the rollout switches and limit switches are closed and the induced-draft motors are not running. The induced-draft motors are then energized, and when speed is proven with the hall effect sensor on the motor, the ignition activation period begins. The burners will ignite within 5 seconds.

When ignition occurs the IGC board will continue to monitor the condition of the rollout and limit switches, the hall effect sensor, as well as the flame sensor. If the unit is controlled through a room thermostat set for fan auto., 45 seconds after ignition occurs, the indoor-fan motor will be energized and the outdoor-air dampers will open to their minimum position. If for some reason the overtemperature limit opens prior to the start of the indoor fan blower, on the next attempt, the 45-second delay will be shortened to 5 seconds less than the time from initiation of heat to when the limit tripped. Gas will not be interrupted to the burners and heating will continue. Once modified, the fan on delay will not change back to 45 seconds unless power is reset to the control. If the unit is controlled through a room sensor, the indoor fan will be operating in the Occupied mode and the outdoor-air dampers will be in the minimum position.

If the unit is controlled with a room sensor in the Unoccupied mode, the indoor fan will be energized through the IGC board with a 45-second delay and the outside-air dampers will move to the IAQ position (generally closed in the Unoccupied mode). If IAQ is not enabled, dampers will move to the minimum position.

When additional heat is required, W2 closes and initiates power to the second stage of the main gas valves. When the thermostat is satisfied, W1 and W2 open and the gas valves close interrupting the flow of gas to the main burners. If the call for W1 lasted less than 1 minute, the heating cycle will not terminate until 1 minute after W1 became active. If the unit is controlled through a room thermostat set for fan auto., the indoor-fan motor will continue to operate for an additional 45 seconds then stop and the outdoor-air dampers will close. If the overtemperature limit opens after the indoor motor is stopped within 10 minutes of W1 becoming inactive, on the next cycle the time will be extended by 15 seconds. The maximum delay is 3 minutes. Once modified, the fan off delay will not change back to 45 seconds unless power is reset to the control. If the unit is controlled through a room sensor, the indoor fan will be operating in the Occupied mode and turned off after 45 seconds in the Unoccupied mode.

GAS HEATING, VARIABLE AIR VOLUME (VAV) UNITS — All of the gas heating control is performed through the integrated gas control (IGC) board. The base module board serves only to initiate and terminate heating operation.

NOTE: The unit is factory-configured for disabled occupied heating. DIP switch 5 is used to enable occupied heating (DIP switch 5 set to OPEN).

Variable Air Volume (VAV) occupied heat is controlled by return-air temperature (RAT) using a 5k thermistor located just below the outdoor-air dampers. A VAV unit without a space temperature sensor is also controlled by RAT. A VAV unit with a space temperature sensor has unoccupied heat controlled by space temperature (SPT).

The base module board is powered by 24 vac. When there is a call for heating (either Morning Warm-Up, Unoccupied, or Occupied modes), power is sent from the base module board to W on each of the IGC boards and W2 of the main gas valve. When heating, the control board will energize a field-supplied heat interlock relay output to drive the VAV terminal boxes wide open. The HIR is not required on a DAV system. See Fig. 47. In the Occupied mode the indoor-fan motor will be operating and the outdoor-air dampers will be in the minimum position. In the Unoccupied mode the indoor-fan motor will be off, but will energize 45 seconds after the call for heat and the outdoor-air dampers will move to the IAQ Unoccupied position (generally set to closed in the Unoccupied mode). The duct pressure sensor will signal to the variable frequency drive to operate at full speed since all terminals have been driven open. An LED on the IGC board will be on during normal operation. A check is made to ensure that the rollout switches and limit switches are closed and the induced-draft motors are not running. The induced-draft motors are then energized and when speed is proven with the hall effect sensor on the motor, the ignition activation period begins. The burners will ignite within 5 seconds.

When ignition occurs the IGC board will continue to monitor the condition of the rollout and limit switches, the hall effect sensor, and the flame sensor.

If the call for heat lasted less than 1 minute, the heating cycle will not terminate until 1 minute after heat became active. When heating is satisfied, the power will be interrupted to the IGC board and W1 and W2 of the main gas valve. If the unit is controlled through a room sensor, the indoor fan will be operating in the Occupied mode and turned off after 45 seconds in the Unoccupied mode.

MORNING WARM-UP (VAV only with PC Accessed/CCN Operation) — Morning warm-up occurs when the control has been programmed to turn on heat prior to the Occupied mode to be ready for occupancy mode. Morning warm-up is a condition in VAV systems that occurs when the Temperature Compensated Start algorithm calculates a biased occupied start time and the unit has a demand for heating. The warm-up will continue into the occupied period as long as there is a need for heat. During warm-up, the unit can continue heating into the occupied period, even if occupied heating is disabled. When the heating demand is satisfied, the warm-up condition will terminate. To increase or decrease the heating demand, use Service Tool software to change the Occupied Heating set point.

NOTE: To utilize Morning Warm-Up mode, the unit occupancy schedule must be accessed via Service Tool, Building Supervisor, or ComfortWorks™ software or accessory LID-2B. The PC can access the base control board via the 3-wire communication bus or via an RJ-11 connection to the CCN terminal on the base control board. See Fig. 20.

For current software (version 3.0 or later), the Low Temperature Minimum Damper Position Override (LOWMDP) has a 0 to 100% limit, with a default of 100%. Think of the LOWMDP as a second minimum damper position. This LOWMDP limit change requires access to the unit software with a computer equipped with Building Supervisor, Service Tool, or ComfortWorks Software.

When the LOWMDP is in effect the outdoor dampers will remain at the LOWMDP position (typically set to 0% closed) during heating, even in the Occupied period. For the LOWMDP to be in effect the LOWMDP must be less than the minimum damper position (MDP). For VAV applications the RAT (return-air temperature) must be less than the OHSP (occupied heat set point) minus 2° F. Table 25 summarizes the operational requirements and controlling factors for occupied heat and morning warm-up.

Table 25 — Occupied Heat and Morning Warm-Up Operation and Controlling Factors

SOFTWARE VERSION	OCCUPIED HEAT ENABLED VIA	MORNING WARM-UP MAY START DURING	TEMPERATURE CONDITION FOR HEAT TO START
3.0 and 3.1	DIP switch no. 5	Smart start or within 10 minutes	RAT < OHSP

LEGEND

OHSP — Occupied Heat Set Point
RAT — Return-Air Temperature
SAT — Supply-Air Temperature

MORNING WARM-UP (VAV Only with Stand-Alone Operation) — When the unit operates in stand-alone mode, morning warm-up occurs when the unit is energized in Occupied mode and return-air temperature (RAT) is below 68 F. Warm-up will not terminate until the RAT reaches 68 F. The heat interlock relay output is energized during morning warm-up. (A field-installed 24-vdc heat interlock relay is required.) The output will be energized until the morning warm-up cycle is complete. Refer to Fig. 47 for heat interlock relay wiring.

SPACE TEMPERATURE RESET SENSOR (VAV Only) — An accessory space temperature sensor (T-55 or T-56 without offset) is required. Space temperature reset is used to reset the supply-air temperature set point of a VAV system higher, as the space temperature falls below the Occupied Cool set point. As the space temperature falls below the Occupied Cool set point, the supply-air temperature will be reset upward as a function of the reset ratio. (Default is 3.) Reset ratio is expressed in degrees change in supply-air temperature per degree of space temperature change. A reset limit will exist which will limit the maximum number of degrees the supply-air temperature may be raised. (Default is 10 F.) Both the reset ratio and the reset limit are user definable. The sequence of operation is as follows:

1. The on/off status of the unit supply fan is determined.
2. If the fan is ‘‘on,’’ the sequence will check if the system is occupied.
3. If the system is occupied, the sequence will determine if the reset option is enabled.
4. If the reset option is enabled, the sequence will read the space temperature and compare it to the Occupied Cool set point. If the temperature is below the Occupied Cool set point, the algorithm will compute the reset value and compare this value against the reset limit. If it is greater than the reset limit, the sequence will use the reset limit as the reset value. See Fig. 48.

   NOTE: A computer equipped with Carrier network access software (ComfortWorks, Building Supervisor, or Service Tool) or an accessory LID-2B is required to enable this function.

Space Temperature Reset Example — The occupied cooling set point is set to 73 F. The Reset Ratio is set to 5. The Reset Limit is set to 20 F. The Reset Ratio determines how many degrees F the temperature is reset. At 72 F, the supply temperature will be reset 5 degrees higher. At 71 F, the supply temperature will be reset 10 degrees higher. At 70 F, the supply temperature will be reset 15 degrees higher. At 69 F, the supply temperature will be reset 20 degrees higher and the Reset Limit will have been reached.

SUPPLY AIR TEMPERATURE RESET — Supply air temperature reset is used to reset the supply air temperature utility. A 4 to 20 mA signal (field-supplied) is required. The reset option does not require enabling.

POWER EXHAUST OPERATION — Power exhaust has two options (constant volume and modulating) that have the following sequence of operation:

The first stage of constant volume (CV) power exhaust is enabled when the indoor fan has been energized and the desired damper position for the economizer increases above the CV power exhaust set point (PES1). The default for PES1 is set at 25% . The second stage of power exhaust is enabled when the desired damper position for the economizer increases above the second CV power exhaust set point (PES2). The default for PES2 is set at 75% . Each stage is disabled when the desired damper position decreases below the respective set points.

The modulating power exhaust is enabled when the indoor fan is energized and the building pressure has exceeded the individual sequencer set points. The default set points are 0.04 in. wg (6.3 vdc) for stage 1, 0.10 in wg (6.8 vdc) for stage 2, 0.16 in wg (7.3 vdc) for stage 3, and 0.23 in. wg (7.8 vdc) for stage 4, 0.29 in. wg (8.3 vdc) for stage 5, and 0.35 in. wg (8.8 vdc) for stage 6 power exhaust sequencer. Each stage also requires that the building pressure is reduced until it drops below the disable set point. The default set points are 0 in wg. (6.0 vdc) for stage 1, 0.060 in. wg (6.5 vdc) for stage 2, 0.13 in. wg (7.0 vdc) for stage 3, 0.19 in. wg (7.4 vdc) for stage 4, 0.25 in. wg (8.0 vdc) for stage 5, and 0.31 in. wg (8.5 vdc) for stage 6 power exhaust sequencer. Both of these set points are changed at the specific controlling sequencer.

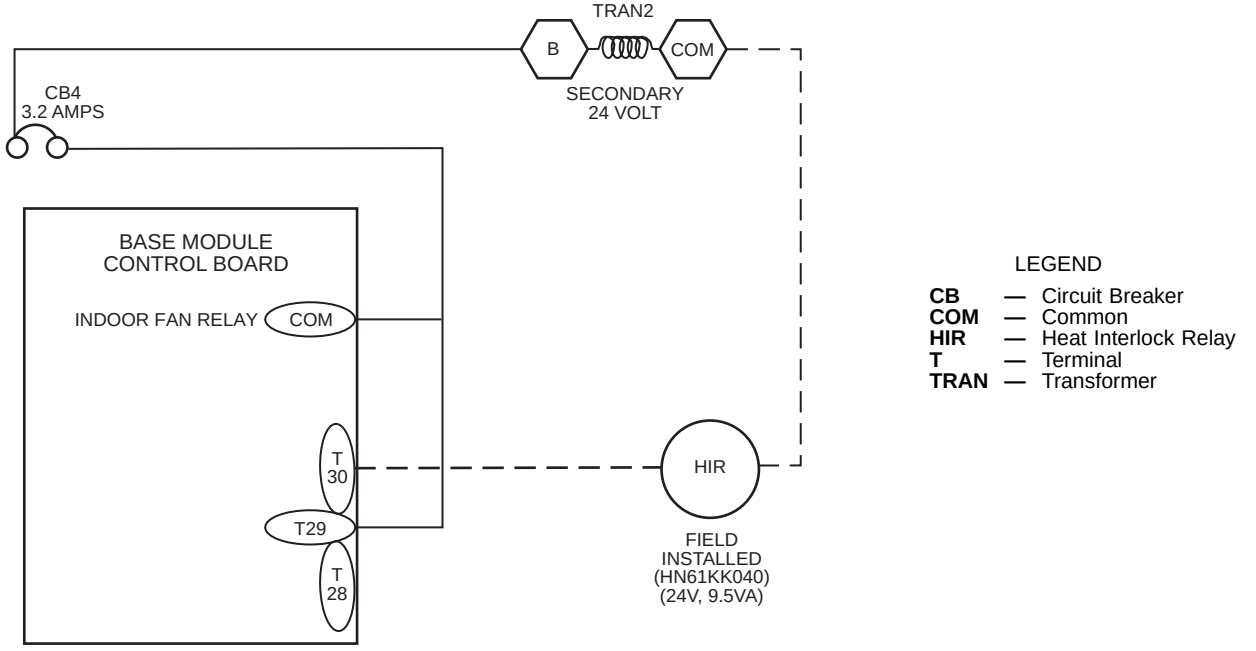
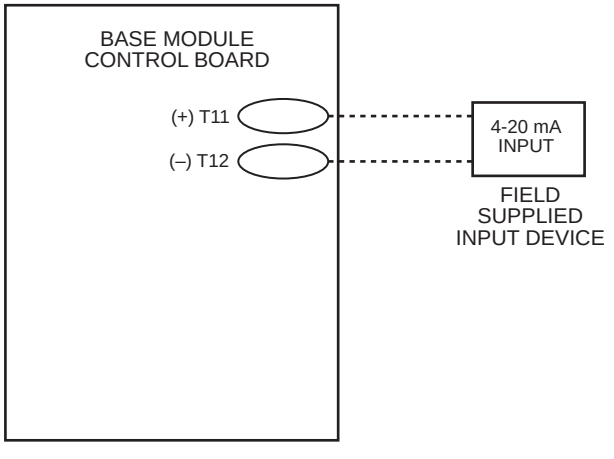


Fig. 47 — Heat Interlock Relay Wiring



LEGEND

T — Terminal

NOTE: The 4 to 20 mA input is a field-supplied non-Carrier EMS (Energy Management System) device.

mA INPUT	DEG. F RESET
4	0.00
5	1.25
6	2.50
7	3.75
8	5.00
9	6.25
10	7.50
11	8.75
12	10.00
13	11.25
14	12.50
15	13.75
16	15.00
17	16.25
18	17.50
19	18.75
20	20.00

Fig. 48 — Space Temperature Reset Wiring

SMOKE CONTROL MODES — The 48EJ,EK,EW,EY units with an optional expansion board perform fire and smoke control modes. The expansion board provides 4 modes which can be used to control smoke within the conditioned area. The modes of operation are fire shutdown, pressurization, evacuation, and smoke purge. See Table 26.

SMOKE DETECTOR — A smoke detector can be used to initiate fire shutdown. This can be accomplished by a set of normally closed pilot relay contacts which will interrupt power from the 24-v transformer, secondary ''B'' terminal to the control circuit breaker (CB4). See Fig. 49. The wire that connects these two points is white and labeled ''W78.''

NOTE: On standard gas models, the indoor fan will continue to run 45 seconds after the call for heat has been terminated. If fire shutdown is initiated the fan will stop immediately. No 45-second delay will occur.

The smoke detector may be mounted in the return air duct or the supply duct. Carrier does not make recommendations as to specific smoke detector location due to liability considerations.

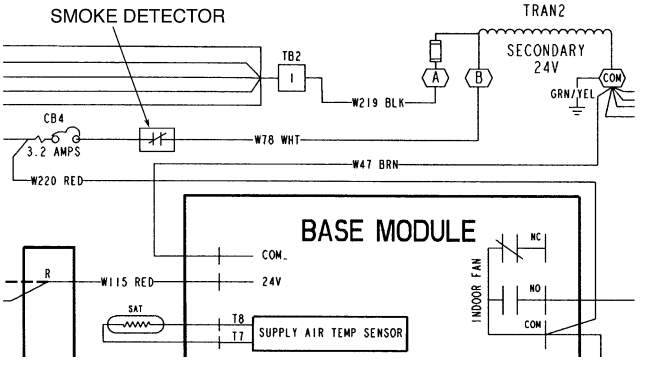


Fig. 49 — Field-Supplied Smoke Detector Wiring

INDOOR AIR QUALITY CONTROL — The accessory expansion board and accessory IAQ sensor are required for IAQ control. The Carrier sensors operate with a 4 to 20 mA signal. The 4 to 20 mA signal is connected to T11 (+) and T12 (−) on the expansion board for the IAQ sensor, and T13 (+) and T14 (−) on the expansion board for the OAQ (Outdoor Air Quality) sensor. The sensor is field-mounted and wired to the expansion board installed in the unit main control box. The IAQ sensor must be powered by a field-supplied 24-v power supply (ungrounded). Do not use the unit 24-v power supply to power the sensor.

Once installed, the sensor must be enabled. The sensor is configured with default values which may be changed through network access software. To work properly, the IAQ sensor high and low reference points for the sensor that is used must match the configured values. The expansion board reacts to a 4 to 20 mA signal from the IAQ sensor. The low reference (4 mA output) must be configured to the minimum IAQ sensor reading. The high reference (20 mA output) must be configured to the maximum IAQ sensor reading.

The IAQ sensor can be configured to either low or high priority. The priority value can be changed by the user. The default is low.

Low priority — When the priority is set to low, the initial control is to the IAQ set point, but the outside air damper position will change to its minimum position when the following conditions occur:

- CV units with sensor — when the space temperature is greater than the occupied cooling set point plus 2° F or when the space temperature is less than the occupied heating set point minus 2° F.
- VAV units and CV units with thermostat — when the supply-air temperature is less than the supply-air temperature set point minus 8° F or when the supply-air temperature is greater than the supply air temperature set point plus 5° F for 4 minutes.
- When the outdoor air quality is greater than the outdoor air quality set point (ppm)

High priority — When the priority is set to high, the IAQ set point controls the outside air damper exclusively, with no regard to comfort conditioning.

TIME GUARD® CIRCUIT — The Time Guard function (built into the rooftop control board) maintains a minimum off time of 5 minutes, a minimum on time of 10 seconds, and a 10-second delay between compressor starts.

CRANKCASE HEATER — Unit main power supply must remain on to provide crankcase heater operation. The crankcase heater in each compressor keeps oil free of refrigerant while compressor is off.

HEAD PRESSURE CONTROL — Each unit has a fan cycling, outdoor thermostat to shut off the outdoor-fan motor(s) at 55 F (one outdoor-fan motor on 024-034 units and 2 outdoor fan motors on 038-048 units and 3 outdoor fan motors on 054-068 units). The head pressure control permits unit to operate with correct condensing temperatures down to 35 F outdoor-air temperature.

MOTORMASTER® III CONTROL — The Motormaster III Solid-State Head Pressure Control is a field-installed accessory fan speed control device actuated by a temperature sensor. It is specifically designed for use on Carrier equipment and controls the condenser-fan motor speed in response to the saturated condensing temperature. For outdoor temperatures down to −20 F, it maintains condensing temperature at 100 F. Refer to the accessory Motormaster installation instructions for more information.

Table 26 — Smoke Control Modes

DEVICE	PRESSURIZATION	SMOKE PURGE	EVACUATION	FIRE SHUTDOWN
Economizer	100%	100%	100%	0%
Indoor Fan/VFD	ON	ON	OFF	OFF
Power Exhaust (all outputs)	OFF	ON	ON	OFF
Heat Stages	OFF	OFF	OFF	OFF
HIR	ON	ON	OFF	OFF

LEGEND

HIR — Heat Interlock Relay
VFD — Variable Frequency Drive

CAPACITY CONTROL, COOLING — The cooling capacity staging tables are shown in Tables 27 and 28.

Table 27 — Cooling Capacity Staging Table, CV Units with 2 Compressors

	Stages			
	0	1 Economizer	2	3
Compressor 1	off	off	on	on
Compressor 2	off	off	off	on

NOTE: On CV units that require additional unloading, add suction pressure unloaders to Compressor 1 only.

Table 28 — Cooling Capacity Staging Table VAV Units with 2 Compressors and 2 Unloaders*

	Stages						
	0	1	2	3	4	5	6
Compressor 1	off	on	on	on	on	on	on
Unloader 1	off	on	on	off	on	on	off
Unloader 2	off	on	off	off	on	off	off
Compressor 2	off	off	off	off	on	on	on

*40 ton units have only one unloader.

FIELD TEST — The field test program is initiated by moving up DIP switch no. 4 to the OPEN position. The outdoor-air damper will close. The control allows 90 seconds for the damper to close in case it was in the full open position. Next, the indoor-fan contactor will be energized, and the outside-air damper will begin to open to its default value of 20% and stay at that position for a short period of time. The outdoor-air damper will then open to its full open position and stay at that position for a short period of time. The outdoor-air damper will then close.

If the unit is equipped with power exhaust, stage 1 will be energized for 5 seconds. If the unit is configured for stage 2 of power exhaust, stage 2 will be energized for 5 seconds after the first stage is deenergized.

The first stage of heat will be energized for 30 seconds, after which the second stage heat will be energized for an additional 30 seconds. Heat is then deenergized.

The last step is the Cooling mode. Outdoor-fan contactor no. 1 is energized. This is followed by each stage of cooling energized with a 10-second delay between stages. After this is complete, outdoor-fan contactor no. 2 is energized for 10 seconds.

The compressors will now deenergize, followed by the outdoor-fan contactors and indoor-fan contactors. If the unit is equipped with the Integrated Gas Control (IGC) board, the indoor fan will continue to operate for an additional 30 seconds after deenergizing the circuit.

The field test is then complete.

SERVICE

⚠ WARNING

Before performing service or maintenance operations on unit, turn off main power switch to unit. Electrical shock could cause personal injury.

Service Access — All unit components can be reached through clearly labelled hinged access doors. These doors are not equipped with tiebacks, so if heavy duty servicing is needed, either remove them or prop them open to prevent accidental closure.

Each door is held closed with 3 latches. The latches are secured to the unit with a single ¼-in. - 20 x ½-in. long bolt. See Fig. 50.

To open, loosen the latch bolt using a 7/16-in. wrench. Pivot the latch so it is not in contact with the door. Open the door. To shut, reverse the above procedure.

NOTE: Disassembly of the top cover may be required under special service circumstances. It is very important that the orientation and position of the top cover be marked on the unit prior to disassembly. This will allow proper replacement of the top cover onto the unit and prevent rainwater from leaking into the unit.

IMPORTANT: After servicing is completed, make sure door is closed and relatched properly, and that the latches are tight. Failure to do so can result in water leakage into the evaporator section of the unit.

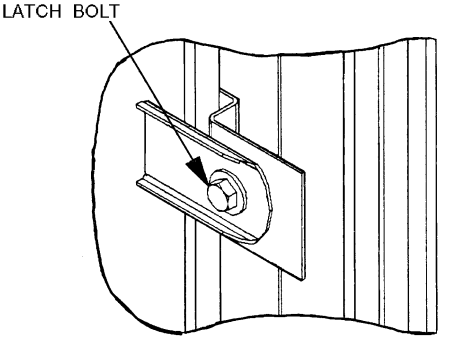


Fig. 50 — Door Latch

Cleaning — Inspect unit interior at beginning of each heating and cooling season and as operating conditions require. Remove unit side panels and/or open doors for access to unit interior.

MAIN BURNERS — At the beginning of each heating season, inspect for deterioration or blockage due to corrosion or other causes. Observe the main burner flames and adjust if necessary. Check spark gap. See Fig. 51. Refer to Main Burners section on page 66.

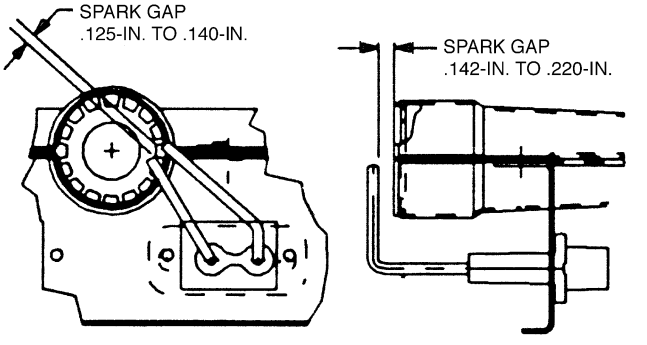


Fig. 51 — Spark Gap Adjustment

FLUE GAS PASSAGEWAYS — The flue collector box and heat exchanger cells may be inspected by removing gas section access panel (Fig. 5-10), flue box cover, collector box, and main burner assembly (Fig. 52 and 53). Refer to Main Burners section on page 66 for burner removal sequence. If cleaning is required, clean all parts with a wire brush. Reassemble using new cerafelt high-temperature insulation for sealing.

COMBUSTION-AIR BLOWER — Clean periodically to assure proper airflow and heating efficiency. Inspect blower wheel every fall and periodically during heating season. For the first heating season, inspect blower wheel bi-monthly to determine proper cleaning frequency.

To inspect blower wheel, remove heat exchanger access panel. Shine a flashlight into opening to inspect wheel. If cleaning is required, remove motor and wheel assembly by removing screws holding motor mounting plate to top of combustion fan housing (Fig. 52 and 53). The motor, scroll, and wheel assembly can be removed from the unit. Remove scroll from plate. Remove the blower wheel from the motor shaft and clean with a detergent or solvent. Replace motor and wheel assembly.

EVAPORATOR COIL — Remove access panels and clean as required with commercial coil cleaner.

CONDENSER COIL — Clean condenser coil annually and as required by location and outdoor-air conditions. Inspect coil monthly; clean as required.

CONDENSATE DRAIN — Check and clean each year at start of cooling season. In winter, keep drains and traps dry.

FILTERS — Clean or replace at start of each heating and cooling season, or more often if operating conditions require. Refer to Table 1 for type and size.

NOTE: The unit requires industrial grade throwaway filters capable of withstanding face velocities up to 625 fpm.

OUTDOOR-AIR INLET SCREENS — Clean screens with steam or hot water and a mild detergent. Do not use disposable filters in place of screens. See Fig. 29 for location of screens (filter track assembly).

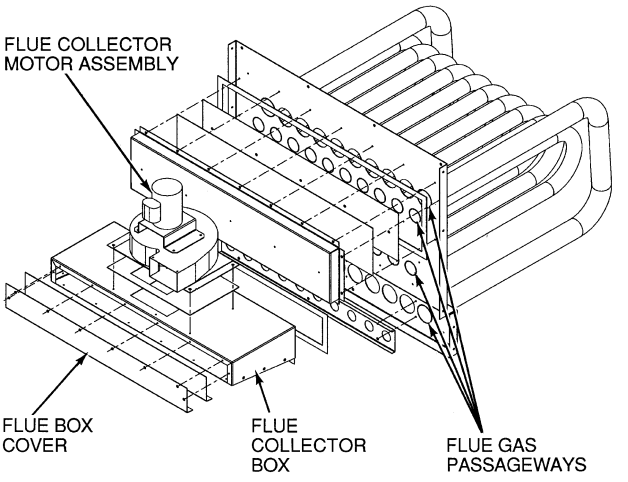
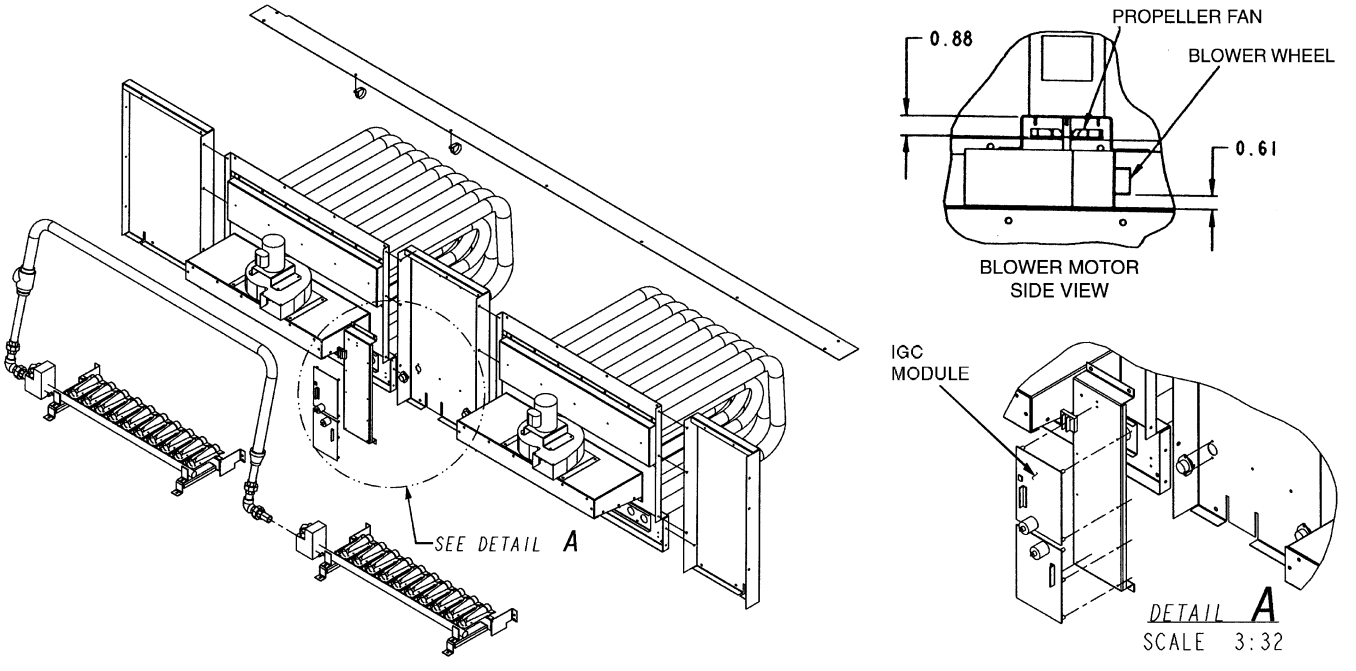


Fig. 53 — Gas Heat Section Details



NOTES:
1. Torque set screws on blower wheel to 70 in. lbs ± 2 in. lbs.
2. Torque set screw on propeller fan to 15 in. lbs ± 2 in. lbs.
3. Dimensions are in inches.

Fig. 52 — Typical Gas Heating Section

Lubrication

COMPRESSORS — Each compressor is charged with the correct amount of oil at the factory. The correct oil charge is shown in Table 1. If oil is visible in the compressor sight glass, check unit for operating readiness as described in Start-Up section, then start the unit. Observe oil level and add oil, if required, to bring oil level in compressor crankcase up to between ¼ and ⅓ of sight glass during steady operation.

If oil charge is above ⅓ sight glass, do not remove any oil until the compressor crankcase heater has been energized for at least 24 hours with compressor off.

When additional oil or a complete charge is required, use only Carrier-approved compressor oil:

Petroleum Specialties, Inc. . . . . Cryol 150
Texaco, Inc. . . . . Capella WF-32
Witco Chemical Corp. . . . . Suniso 3GS

IMPORTANT: Do not use reclaimed oil or oil that has been exposed to the atmosphere. Refer to Carrier Standard Service Techniques Manual, Chapter 1, Refrigerants section, for procedures to add or remove oil.

FAN SHAFT BEARINGS — Lubricate bearings at least every 6 months with suitable bearing grease. Do not over grease. Typical lubricants are given below:

MANUFACTURER	LUBRICANT
Texaco	Regal AFB-2*
Mobil	Mobilplex EP No. 1
Sunoco	Prestige 42
Texaco	Multifak 2

*Preferred lubricant because it contains rust and oxidation inhibitors.

CONDENSER- AND EVAPORATOR-FAN MOTOR BEARINGS — The condenser- and evaporator-fan motors have permanently-sealed bearings, so no field lubrication is necessary.

Evaporator Fan Performance Adjustment (Fig. 54) — Fan motor pulleys are designed for speed shown in Table 1 (factory speed setting).

IMPORTANT: Check to ensure that the unit drive matches the duct static pressure using Tables 15-19.

To change fan speeds, change pulleys.

To align fan and motor pulleys:

1. Shut off unit power supply.
2. Loosen fan shaft pulley bushing.
3. Slide fan pulley along fan shaft.
4. Make angular alignment by loosening motor from mounting plate.
5. Retighten pulley.

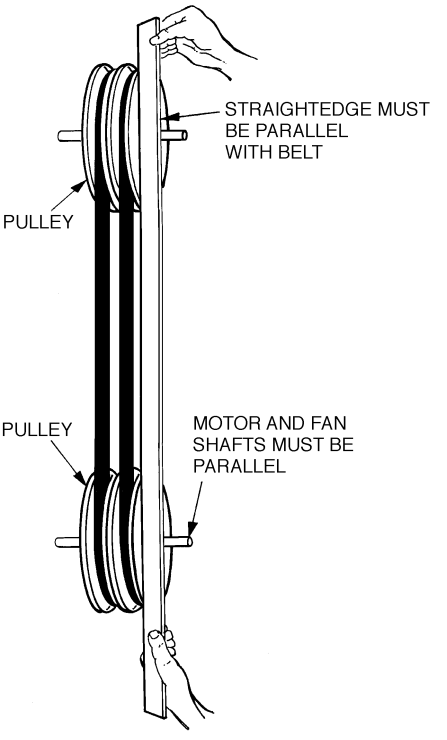


Fig. 54 — Evaporator-Fan Alignment and Adjustment

Evaporator Fan Coupling Assembly — If the coupling has been removed for other blower assembly component repair or replacement, it is critical that the coupling be reassembled and aligned correctly to prevent premature failures.

REASSEMBLING THE COUPLING INTO THE UNIT (Fig. 55)

1. Prior to reassembling the coupling, loosen the 4 bearing mounting bolts, which secure the 2 bearings on either side of the coupling. Remove the drive belts.
2. Reassemble the coupling with the bearings loose. This allows the coupling to find its own self-alignment position.
3. Check the hub-to-shaft fit for close fitting clearances. Replace hubs if high clearances are determined.
4. Check the key for close-fitted clearances on the sides and 0.015 in. clearance over the top of the key. Replace key if necessary.

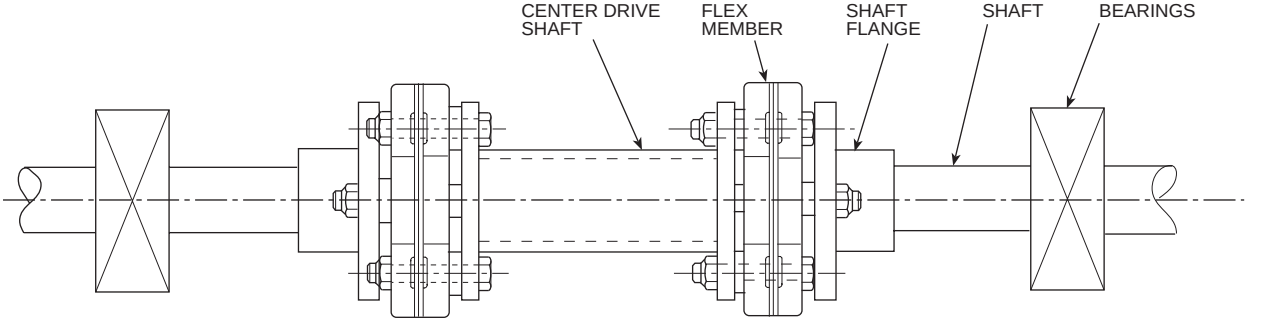


Fig. 55 — Evaporator Fan Coupling

5. Be sure that hub flanges, flex members, spacer, and hardware are clean and free of oil.
6. Place the flanges onto the shafts with the hub facing outward. Do not tighten the set screws at this time.
7. Outside of the unit, assemble the flex members to the center drive shaft with 4 bolts and nuts. The flex members have collars that need to be inserted into the smaller hole of the drive shaft flange.
8. Assemble the flex member/drive shaft assembly to one of the shaft flanges, using 2 bolts and nuts. Slide the other shaft flange towards the assembly and assemble using 2 bolts and nuts. If the shafts are not misaligned, the collar in the flex member should line up with the shaft flange holes.
9. Torque nuts properly to 95 to 100 ft-lb. Do not turn a coupling bolt. Always turn the nut. Always use thread lubricant or anti-seize compound to prevent thread galling.
10. The ends of the shafts should be flush with the inside of the shaft flange. Torque the set screws to 25 ft-lb.
11. After assembly is complete, slowly rotate the shafts by hand for 30 to 60 seconds.
12. Tighten the bearing mounting bolts, using care not to place any loads on the shaft which would cause flexure to the shafts.
13. Reinstall drive belts. (Refer to Belt Tension Adjustment section below).
14. Visually inspect the assembly. If the shafts are overly misaligned, the drive shaft flange will not be parallel with the shaft flanges.
15. Recheck nut torque after 1 to 2 hours of operation. Bolts tend to relax after being initially torqued.

Evaporator Fan Service and Replacement

1. Shut off unit power supply.
2. Remove supply-air section panels.
3. Remove belt and blower pulley.
4. Loosen setscrews in blower wheels.
5. Remove locking collars from bearings.
6. Remove shaft.
7. Remove venturi on opposite side of bearing.
8. Lift out wheel.
9. Reverse above procedure to reinstall fan.
10. Check and adjust belt tension as necessary.

Belt Tension Adjustment — To adjust belt tension:

1. Shut off unit power supply.
2. Loosen motor mounting nuts and bolts. See Fig. 56.
3. Loosen fan motor nuts.
4. Turn motor jacking bolts to move motor mounting plate left or right for proper belt tension. A slight bow should be present in the belt on the slack side of the drive while running under full load.
5. Tighten nuts.
6. Adjust bolts and nut on mounting plate to secure motor in fixed position. Recheck belt tension after 24 hours of operation. Adjust as necessary. See Table 3 for proper tension values.

Evaporator-Fan Motor Replacement

1. Shut off unit power supply.
2. Remove upper outside panel and open hinged door to gain access to motor.
3. Fully retract motor plate adjusting bolts.
4. Loosen the 2 rear (nearest the evaporator coil) motor plate nuts.
5. Remove the 2 front motor plate nuts and carriage bolts.
6. Slide motor plate to the rear (toward the coil) and remove fan belt(s).
7. Slide motor plate to the front and hand tighten one of the rear motor plate nuts (tight enough to prevent the motor plate from sliding back but loose enough to allow the plate to pivot upward).
8. Pivot the front of the motor plate upward enough to allow access to the motor mounting hex bolts and secure in place by inserting a prop.
9. Remove the nuts from the motor mounting hex bolts and remove motor.
10. Reverse above steps to install new motor.

Condenser-Fan Adjustment

1. Shut off unit power supply.
2. Remove fan guard.
3. Loosen fan hub setscrews.
4. Adjust fan height on shaft using a straightedge placed across venturi and measure per Fig. 57.
5. Fill hub recess with permagum if rubber hubcap is missing.
6. Tighten setscrews and replace panel(s).
7. Turn on unit power.

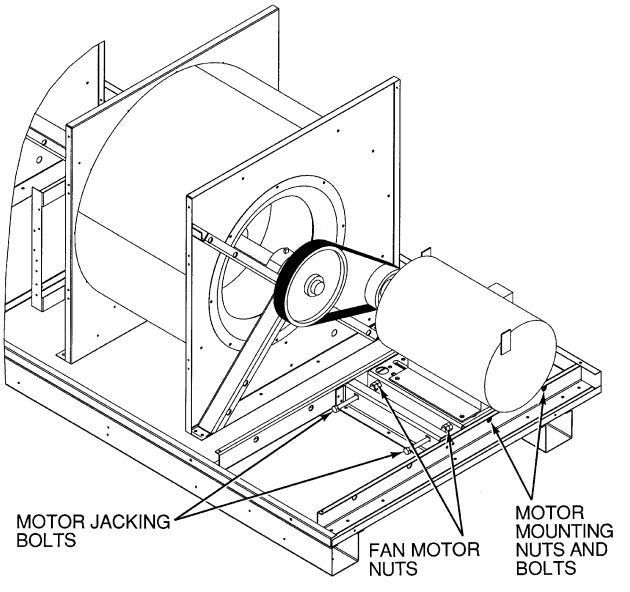


Fig. 56 — Belt Tension Adjustment

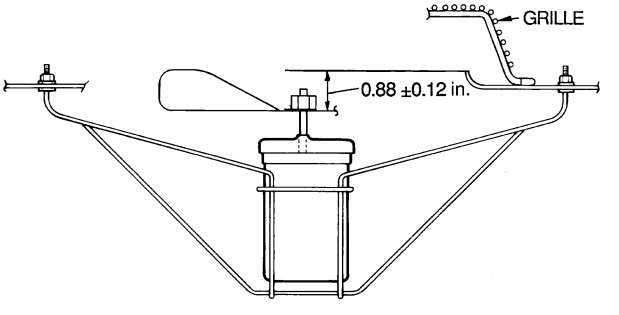


Fig. 57 — Condenser-Fan Adjustment

Power Failure — The economizer damper motor is a spring return design. In event of power failure, dampers will return to fully closed position until power is restored.

Refrigerant Charge — Amount of refrigerant charge is listed on unit nameplate and in Table 1. Refer to Carrier GTAC II; Module 5; Charging, Recovery, Recycling, and Reclamation section for charging methods and procedures.

Unit panels must be in place when unit is operating during charging procedure.

NOTE: Do not use recycled refrigerant as it may contain contaminants.

NO CHARGE — Use standard evacuating techniques. After evacuating system, weigh in the specified amount of refrigerant (refer to Table 1).

LOW CHARGE COOLING — Using appropriate cooling charging chart (see Fig. 58-60), add or remove refrigerant until conditions of the appropriate chart are met. Note that charging chart is different from those normally used. An accurate pressure gage and temperature sensing device are required. Measure liquid line pressure at the liquid line service valve using pressure gage. Connect temperature sensing device to the liquid line near the liquid line service valve and insulate it so that outdoor ambient temperature does not affect reading.

Using the above temperature and pressure readings, find the intersect point on the appropriate cooling charging chart. If intersection point on chart is above line, add refrigerant. If intersection point on chart is below line, carefully reclaim some of the charge. Recheck suction pressure as charge is adjusted.

NOTE: Indoor-air cfm must be within normal operating range of unit. All outdoor fans must be operating.

Thermostatic Expansion Valve (TXV) — Each circuit has a TXV. The TXV is nonadjustable and is factory set to maintain 10 to 13° F superheat leaving the evaporator coil. The TXV controls flow of liquid refrigerant to the evaporator coils.

Gas Valve Adjustment

NATURAL GAS — The 2-stage gas valve opens and closes in response to the thermostat or limit control.

When power is supplied to valve terminals 3 and 4, the pilot valve opens to the preset position. When power is supplied to terminals 1 and 2, the main valve opens to its preset position.

The regular factory setting is stamped on the valve body (3.5 in. wg).

To adjust regulator:

1. Set thermostat at setting for no call for heat.
2. Turn main gas valve to OFF position.
3. Remove ⅛-in. pipe plug from manifold. Install a water manometer pressure-measuring device.
4. Set main gas valve to ON position.
5. Set thermostat at setting to call for heat.
6. Remove screw cap covering regulator adjustment screw (See Fig. 61).
7. Turn adjustment screw clockwise to increase pressure or counterclockwise to decrease pressure.
8. Once desired pressure is established, set thermostat setting for no call for heat, turn off main gas valve, remove pressure-measuring device and replace ⅛-in. pipe plug and screw cap.

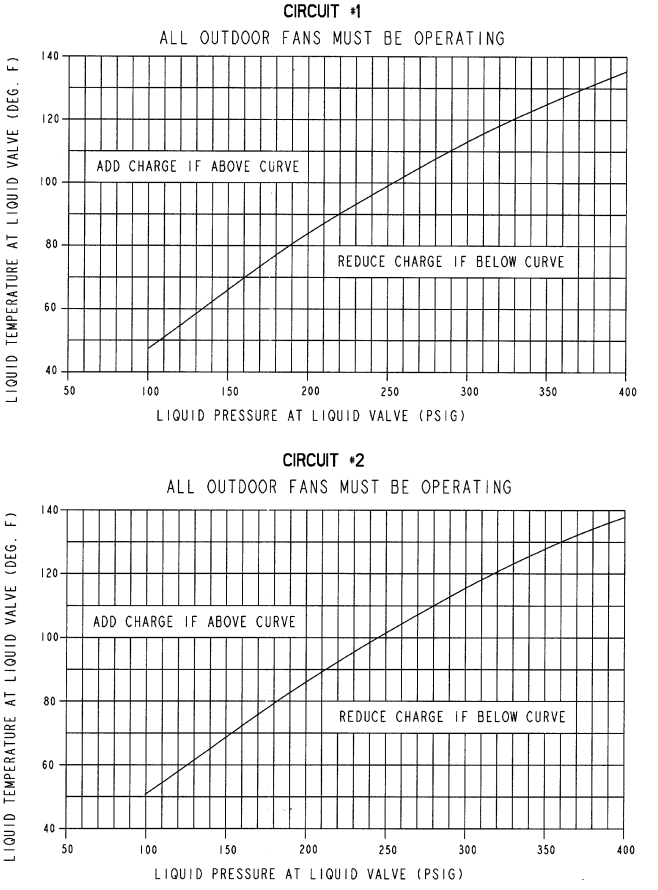

CIRCUIT #1
ALL OUTDOOR FANS MUST BE OPERATING
LIQUID TEMPERATURE AT LIQUID VALVE (DEG. F)
ADD CHARGE IF ABOVE CURVE
REDUCE CHARGE IF BELOW CURVE
LIQUID PRESSURE AT LIQUID VALVE (PSIG)
CIRCUIT #2
ALL OUTDOOR FANS MUST BE OPERATING
LIQUID TEMPERATURE AT LIQUID VALVE (DEG. F)
ADD CHARGE IF ABOVE CURVE
REDUCE CHARGE IF BELOW CURVE
LIQUID PRESSURE AT LIQUID VALVE (PSIG)

Fig. 58 — Cooling charging chart, 48EJ,EK,EW,EY024-034

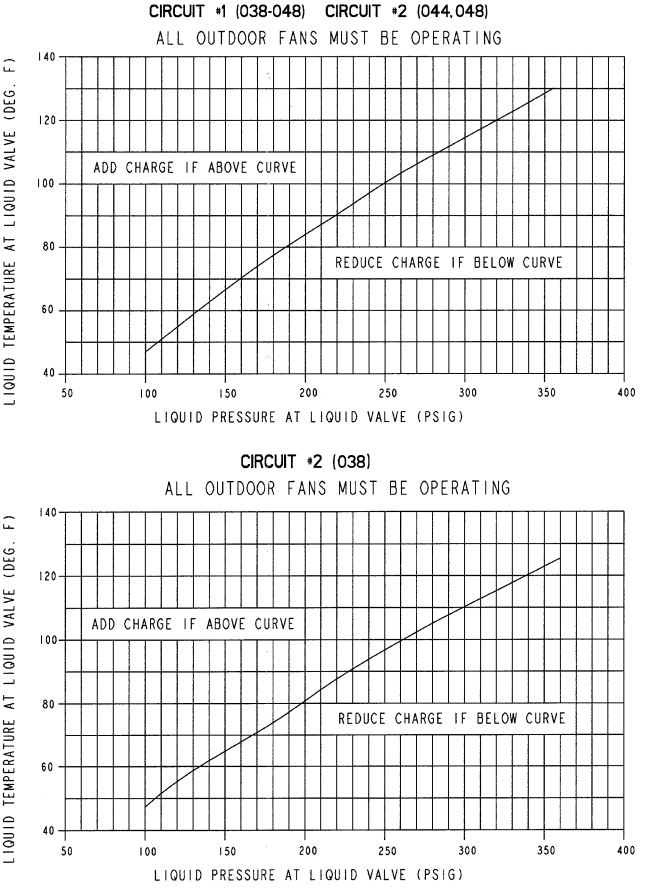

CIRCUIT #1 (038-048) CIRCUIT #2 (044,048)
ALL OUTDOOR FANS MUST BE OPERATING
LIQUID TEMPERATURE AT LIQUID VALVE (DEG. F)
ADD CHARGE IF ABOVE CURVE
REDUCE CHARGE IF BELOW CURVE
LIQUID PRESSURE AT LIQUID VALVE (PSIG)
CIRCUIT #2 (038)
ALL OUTDOOR FANS MUST BE OPERATING
LIQUID TEMPERATURE AT LIQUID VALVE (DEG. F)
ADD CHARGE IF ABOVE CURVE
REDUCE CHARGE IF BELOW CURVE
LIQUID PRESSURE AT LIQUID VALVE (PSIG)

Fig. 59 — Cooling Charging Chart, 48EJ,EK,EW,EY038-048

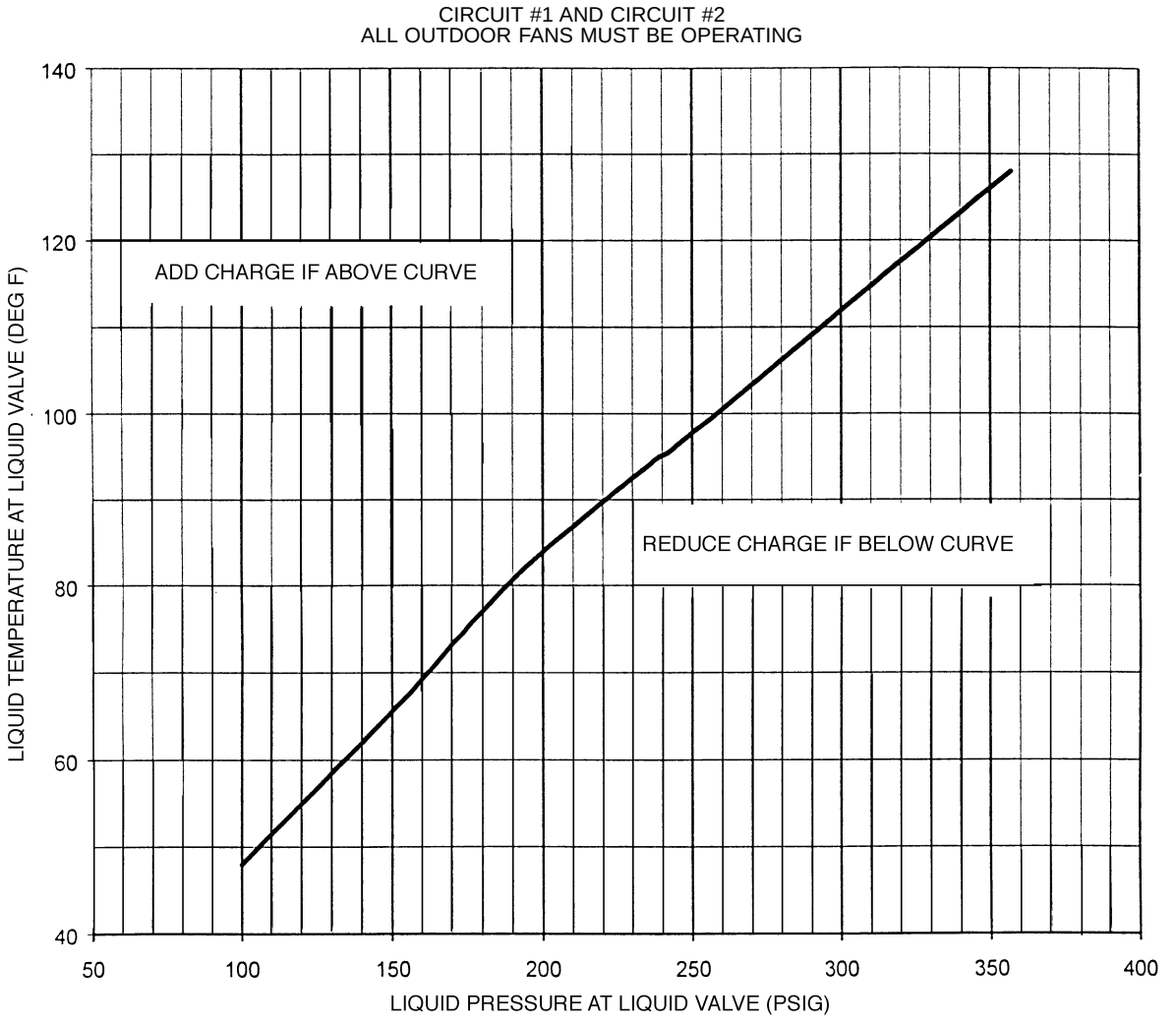


Fig. 60 — Cooling Charging Chart, 48EJ,EK,EW,EY054-068

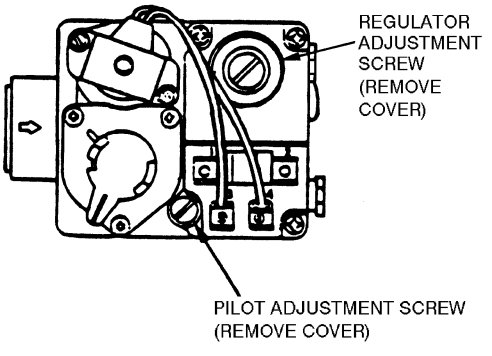


Fig. 61 — Gas Valve

Main Burners — For all applications, main burners are factory set and should require no adjustment.

MAIN BURNER REMOVAL (Fig. 62)

1. Shut off (field-supplied) manual main gas valve.
2. Shut off power to unit.
3. Remove heating access panel.
4. Disconnect gas piping from gas valve inlet.
5. Remove wires from gas valve.
6. Remove wires from rollout switch.
7. Remove sensor wire and ignitor cable from IGC board.
8. Remove 2 screws securing manifold bracket to basepan.
9. Remove 4 screws that hold the burner support plate flange to the vestibule plate.
10. Lift burner assembly out of unit.
11. Reverse procedure to re-install burners.

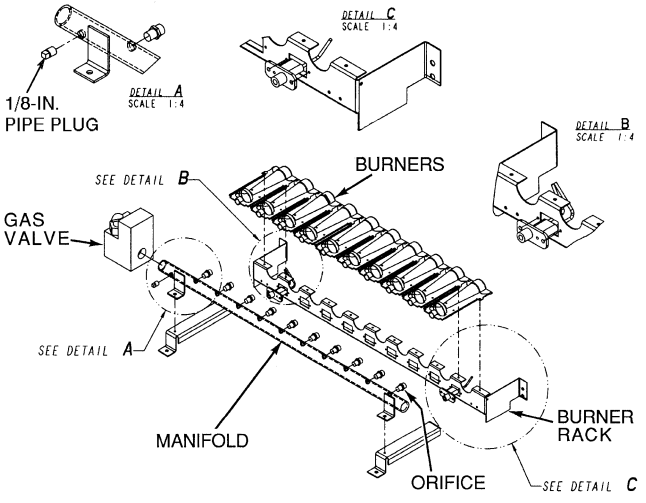


Fig. 62 — Main Burner Removal

Filter Drier — Replace whenever refrigerant system is exposed to atmosphere.

Protective Devices

COMPRESSOR PROTECTION

Overcurrent — Each compressor has one manual reset, calibrated trip, magnetic circuit breaker. Do not bypass connections or increase the size of the circuit breaker to correct trouble. Determine the cause and correct it before resetting the breaker.

Overtemperature — Each 06D type compressor (024-038 units only) has an internal protector to protect it against excessively high discharge gas temperatures.

Crankcase Heater — Each compressor has a crankcase heater to prevent absorption of liquid refrigerant by oil in the crankcase when the compressor is idle. Since power for the crankcase heaters is drawn from the unit incoming power, main unit power must be on for the heaters to be energized.

IMPORTANT: After a prolonged shutdown or service job, energize the crankcase heaters for 24 hours before starting the compressors.

EVAPORATOR FAN MOTOR PROTECTION — A manual reset, calibrated trip, magnetic circuit breaker protects against overcurrent. Do not bypass connections or increase the size of the breaker to correct trouble. Determine the cause and correct it before resetting the breaker. If the evaporator-fan motor is replaced with a different horsepower motor, resizing of the circuit breaker is required. Contact Carrier Application Engineering.

CONDENSER-FAN MOTOR PROTECTION — Each condenser-fan motor is internally protected against overtemperature.

HIGH- AND LOW-PRESSURE SWITCHES — If either switch trips, or if the compressor overtemperature switch activates, that refrigerant circuit will be automatically stopped. See Compressor Lockout Logic section on this page.

FREEZE PROTECTION THERMOSTAT (FPT) — Freeze protection thermostats are located on the evaporator coil for each circuit. One is located at the top and bottom of each circuit. It detects frost build-up and turns off the compressor, allowing the coil to clear. Once the frost has melted, the compressor can be reenergized.

Relief Devices — All units have relief devices to protect against damage from excessive pressures (i.e., fire). These devices are installed on the suction line, liquid line, and on the compressor.

Power Circuit — A typical power wiring schematic is shown in Fig. 63.

Control Circuit, 115-V — This control circuit is protected against overcurrent by a 5.0 amp circuit breaker (CB3). Breaker can be reset. If it trips, determine cause of trouble before resetting. A typical 115-v control wiring schematic is shown in Fig. 64 and 65.

Control Circuit, 24-V — This control circuit is protected against overcurrent by a 3.2 amp circuit breaker (CB4). Breaker can be reset. If it trips, determine cause of trouble before resetting. A typical 24-v control wiring schematic is shown in Fig. 66 and 67.

Compressor Lockout Logic — If any of the safeties trip, the circuit will automatically reset (providing the safety has reset) and restart the compressor in 15 minutes. If any of the safeties trip 3 times within a 90-minute period, then the circuit will be locked out and will require manual resetting by turning off either the unit disconnect or the control circuit breaker, or opening the thermostat.

Replacement Parts — A complete list of replacement parts may be obtained from any Carrier distributor upon request.

LEGEND for Fig. 63-67 — Typical Wiring Schematics

LEGEND

AHA — Adjustable Heat Anticipator
BP — Building Pressure
BR — Burner Relay
C — Contactor, Compressor
CAP — Capacitor
CB — Circuit Breaker
CC — Cooling Compensator
CCB — Controller Circuit Breaker
CCH — Crankcase Heater
COM — Communication
COMP — Compressor Motor
CR — Control Relay
CV — Constant Volume
DM — Damper Motor
DP — Duct Pressure
EC — Enthalpy Control
EQUIP — Equipment
FLA — Full Load Amps
FPT — Freeze Protection Thermostat
FU — Fuse
GRD — Ground
GVR — Gas Valve Relay
HC — Heater Contactor
HPS — High-Pressure Switch
HR — Heater Relay
HS — Hall Effect Sensor
HV — High Voltage
IDM — Induced-Draft Motor
IFC — Indoor Fan Contactor
IFCB — Indoor Fan Circuit Breaker
IFM — Indoor-Fan Motor
IFR — Indoor-Fan Relay
IGC — Integrated Gas Unit Controller
IP — Internal Protector
L — Light
LPS — Low-Pressure Switch
LS — Limit Switch
MGV — Main Gas Valve
NC — Normally Closed
NO — Normally Open
OAT — Outdoor-Air Thermistor
OD — Outdoor
OFC — Outdoor-Fan Contactor
OFM — Outdoor-Fan Motor
PEC — Power Exhaust Contactor
PEM — Power Exhaust Motor
PES — Power Exhaust Sequencer
PESC — Power Exhaust Sequencer Controller
PL — Plug Assembly
R — Relay
RAT — Return-Air Thermistor
RS — Rollout Switch
SAT — Supply-Air Thermistor
SEN — Sensor
SW — Switch
TB — Terminal Block
TC — Thermostat Cooling
TH — Thermostat Heating
TRAN — Transformer
UL — Compressor Unloader
VFD — Variable Frequency Drive

Terminal (Marked)

Terminal (Unmarked)

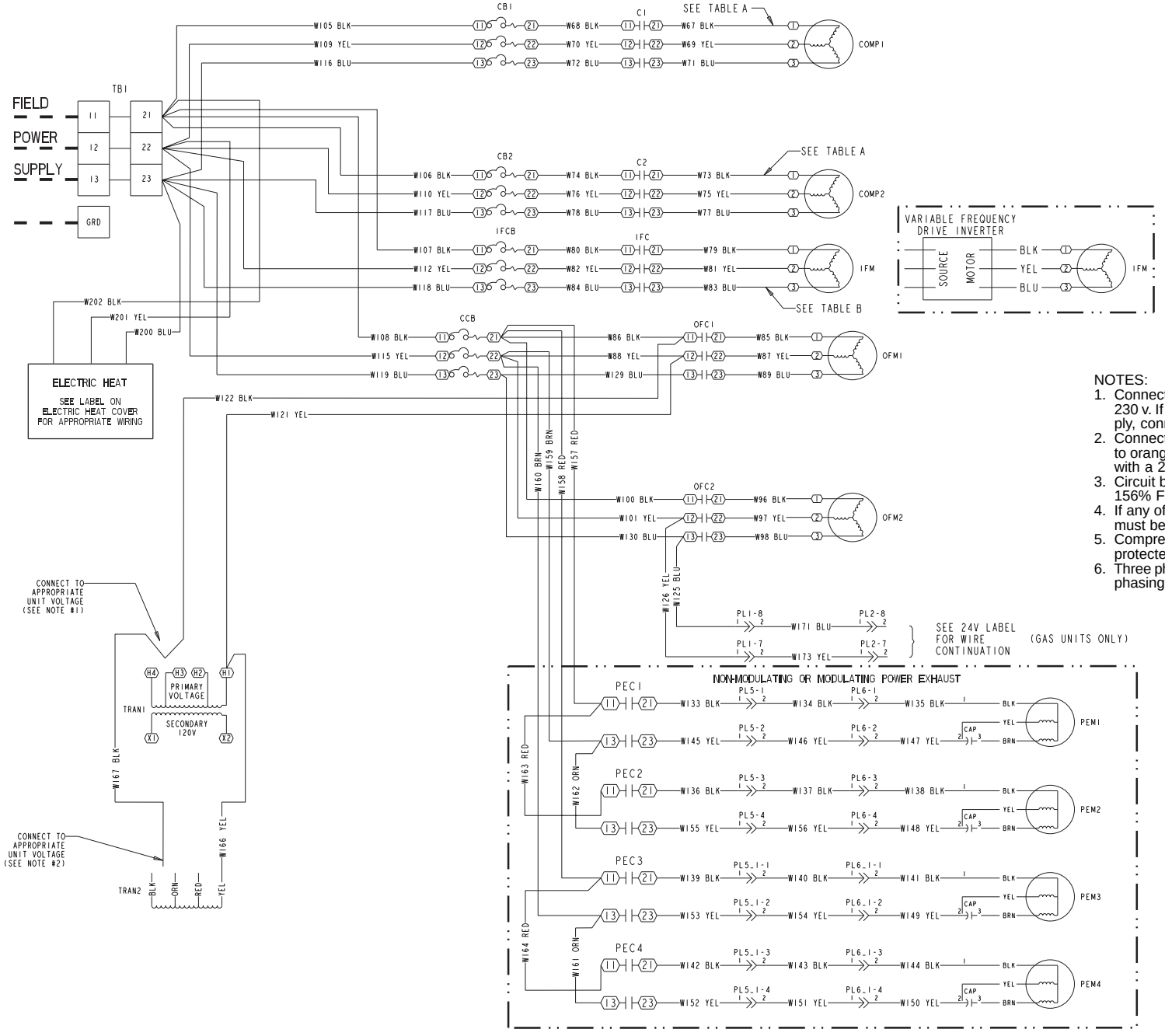
Terminal Block

Splice

Factory Wiring

Field Wiring

To Indicate Common Potential Only, Not To Represent Wiring



NOTES:
1. Connect TRAN1 to H4 for 460 v units. Connect to H3 for 230 v. If 208/230 v units are run with a 208-v power supply, connect to H2.
2. Connect TRAN2 to black lead for 460 v units. Connect to orange lead for 230 v units. If 208/230 v units are run with a 208-v power supply, connect to red lead.
3. Circuit breaker must trip amps are equal to or less than 156% FLA for CB1 and CB2. All others are 140%.
4. If any of the original wire furnished must be replaced, it must be replaced with Type 90 C wire or its equivalent.
5. Compressors and/or fan motors are thermally protected.
6. Three phase motors are protected against primary single phasing conditions.

TABLE 1A

The following compressors have two parallel wires run from TB1 to the compressors.

Compressor Model	Voltage	Wire Quantity
06D-537	208/230-3-60	2

TABLE 2B

The following fan motors have two parallel wires run from TB1 to the fan motors.

Indoor Motor	Voltage	Wire Quantity
20 HP	208/230-3-60	2

Fig. 63 — Typical Power Schematic 48EJ,EK,EW,EY024-034; 208/230-3-60 and 460-3-60

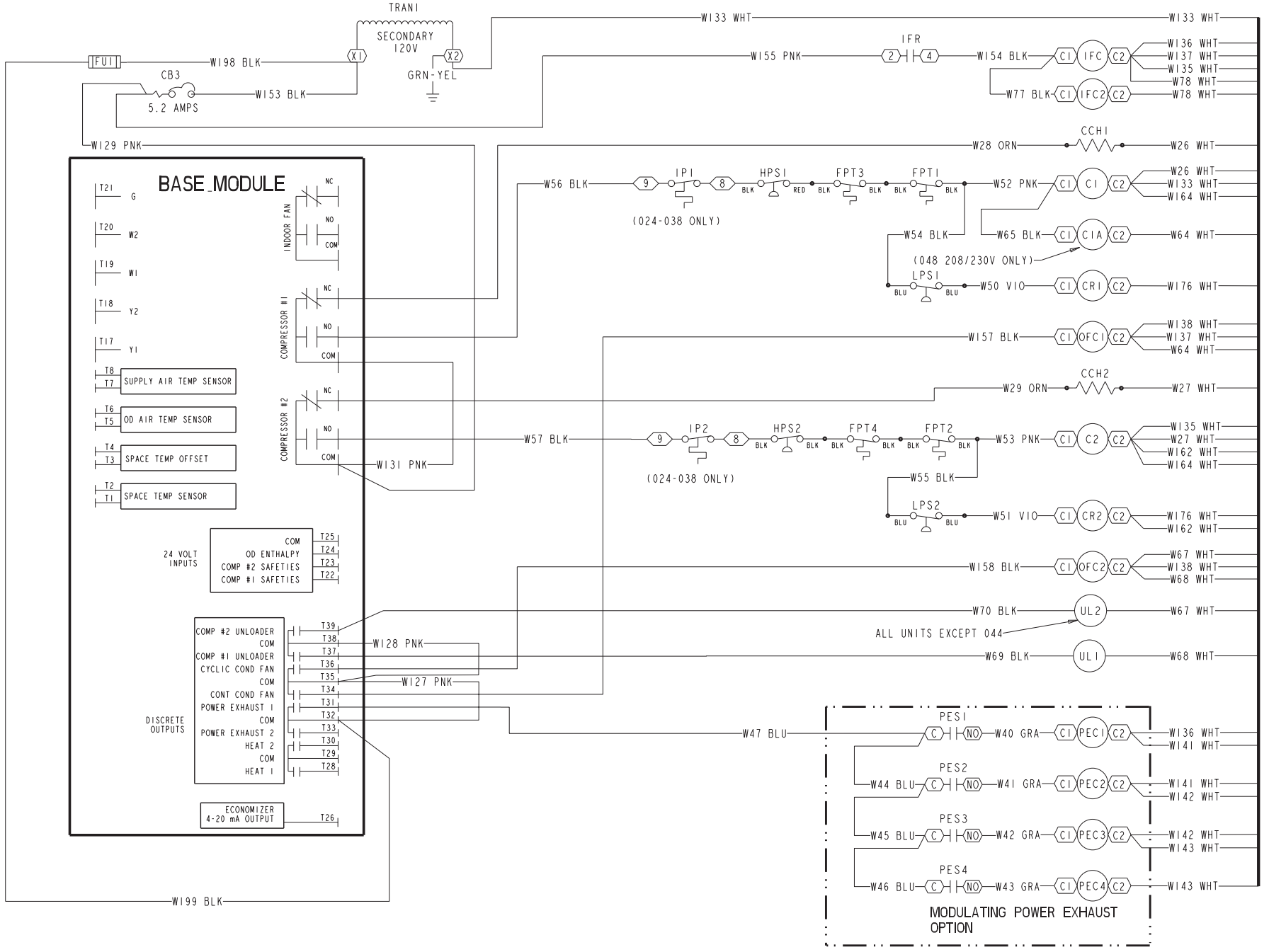


Fig. 64 — Typical VAV 115-V Control Circuit

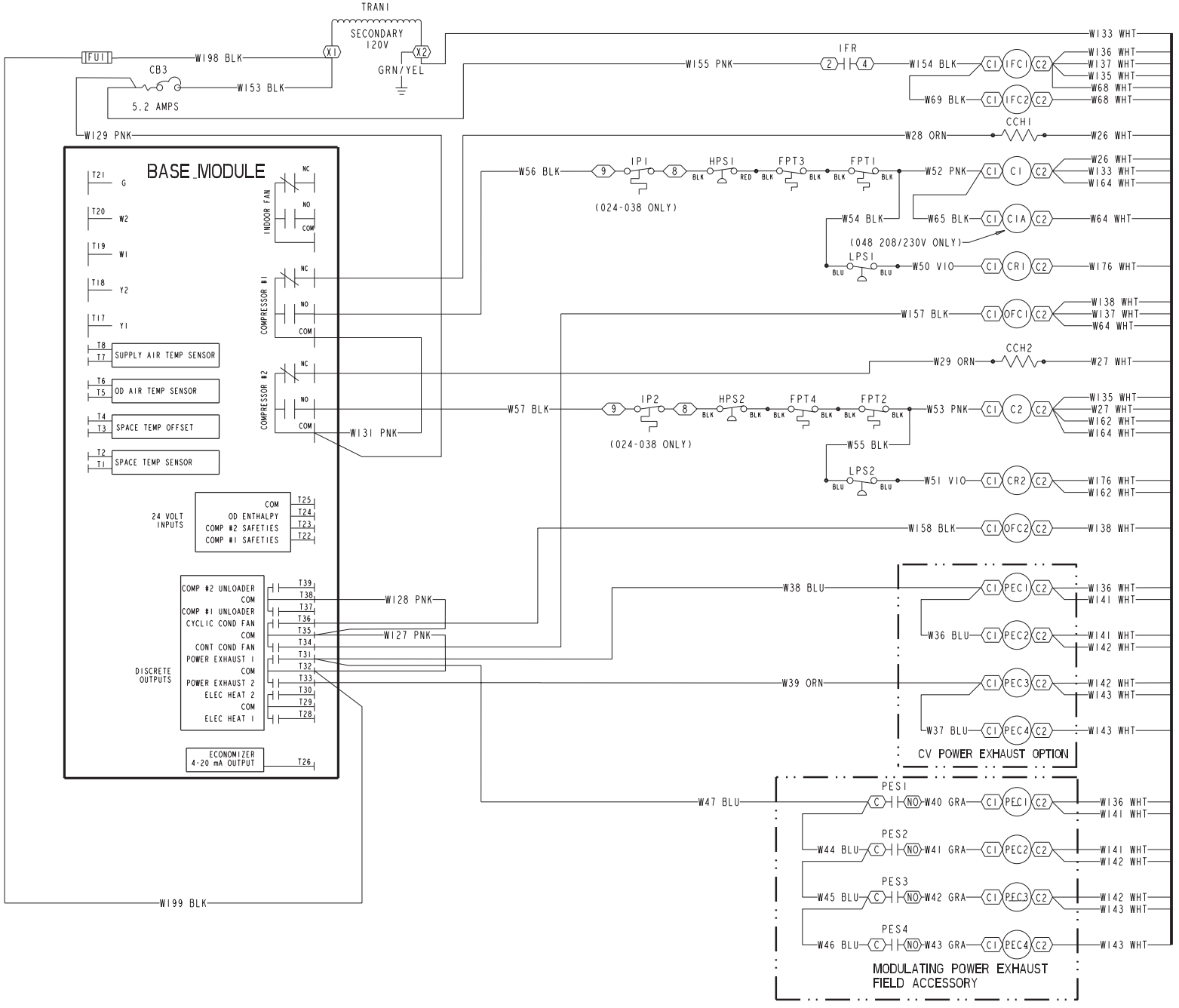
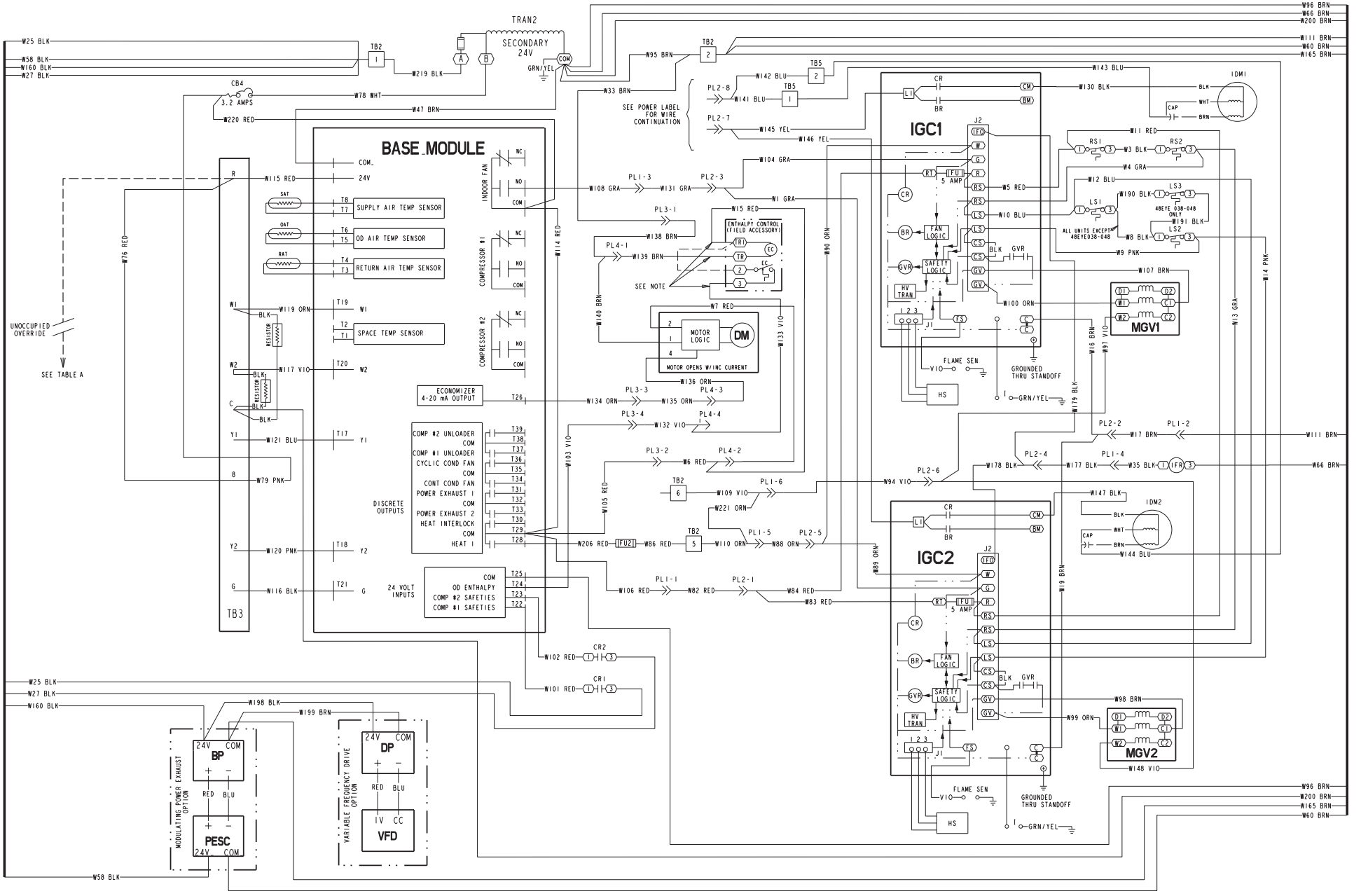
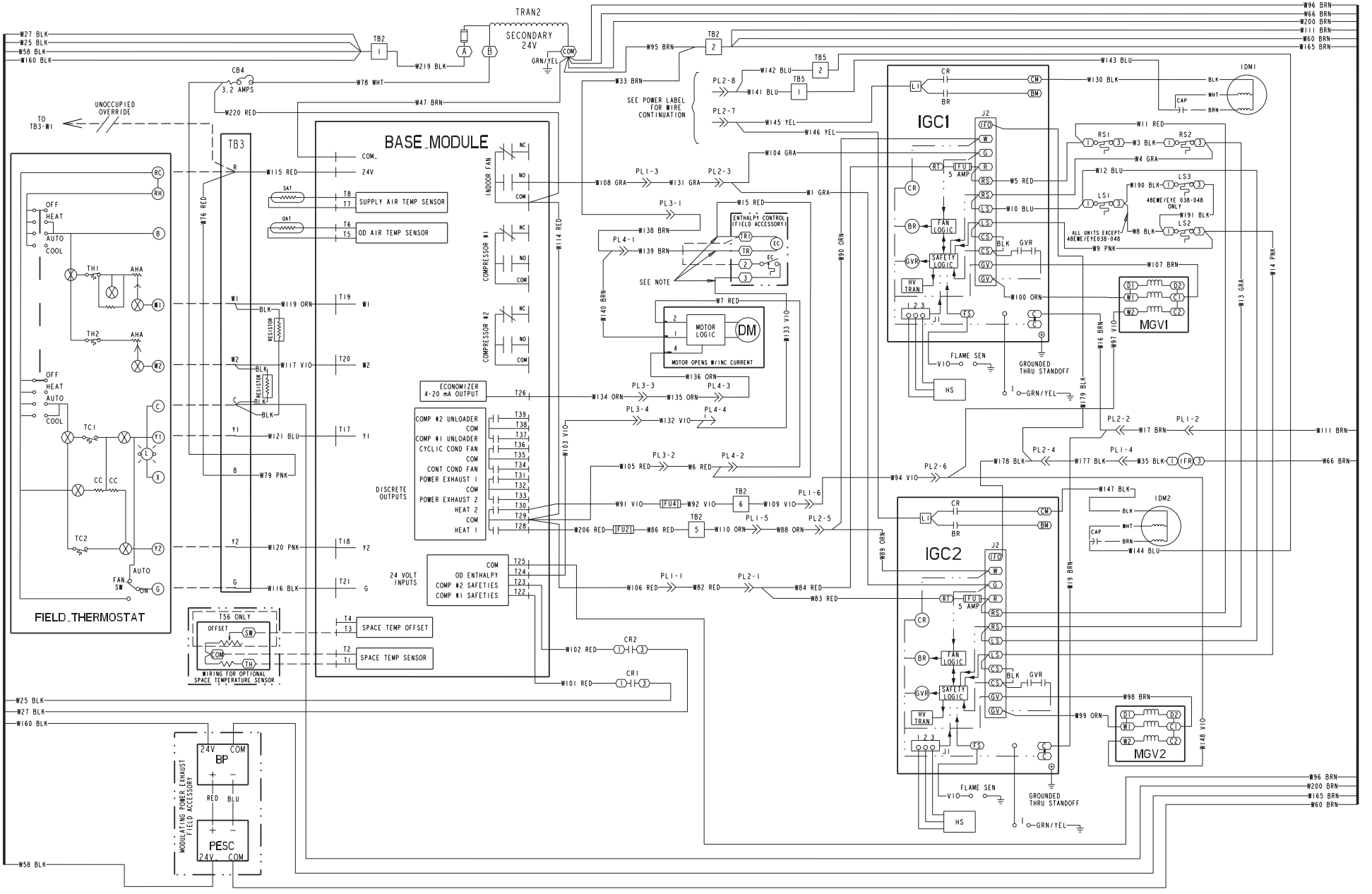


Fig. 65 — Typical CV 115-V Control Circuit



NOTE: Red wire and violet wire are spliced together at the factory. The brown wire has a wire nut added at the factory.

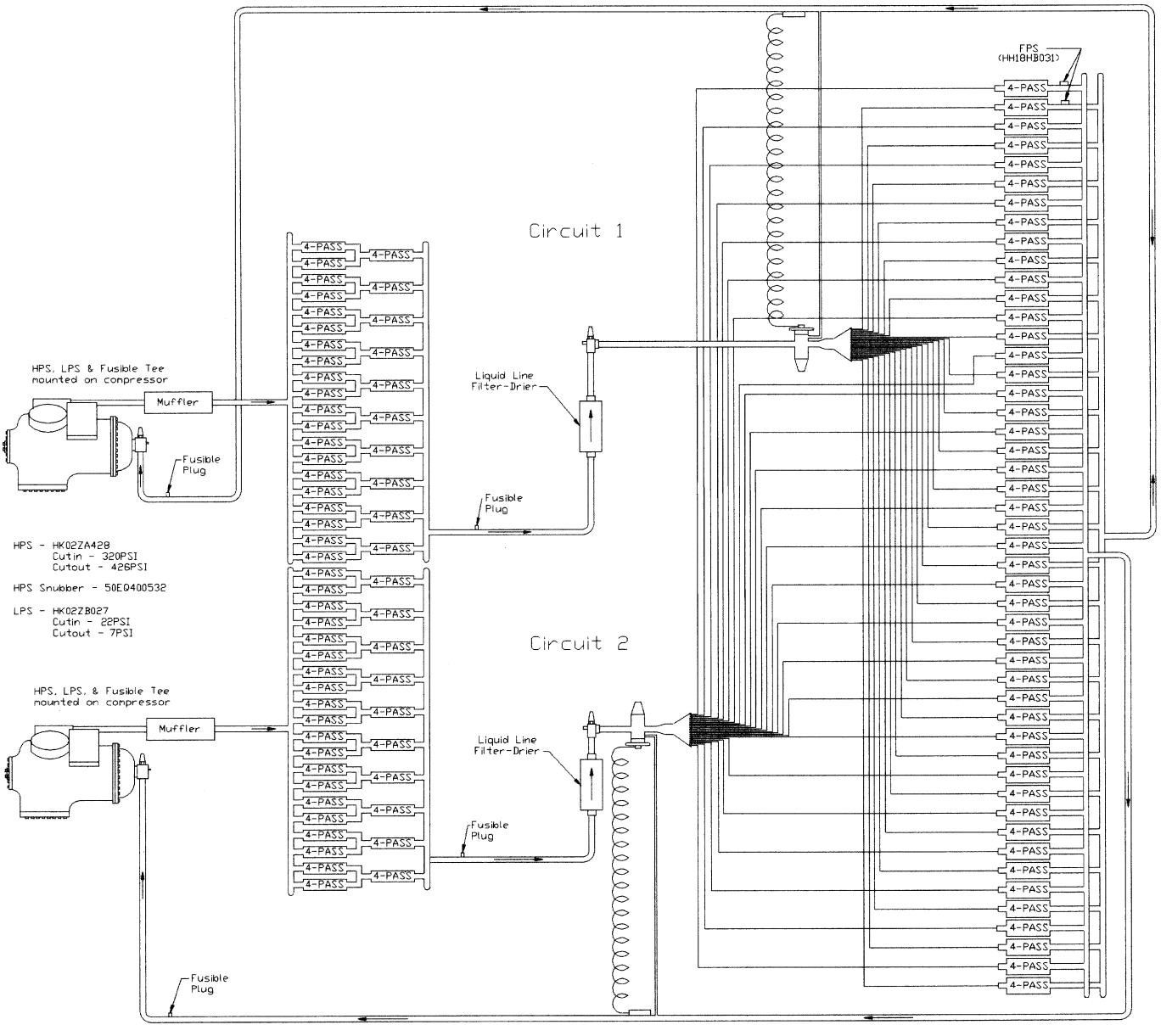
Fig. 66 — Typical VAV 24-V Control Circuit



NOTE: Red wire and violet wire are spliced together at the factory. The brown wire has a wire nut added at the factory.

Fig. 67 — Typical CV 24-V Control Circuit

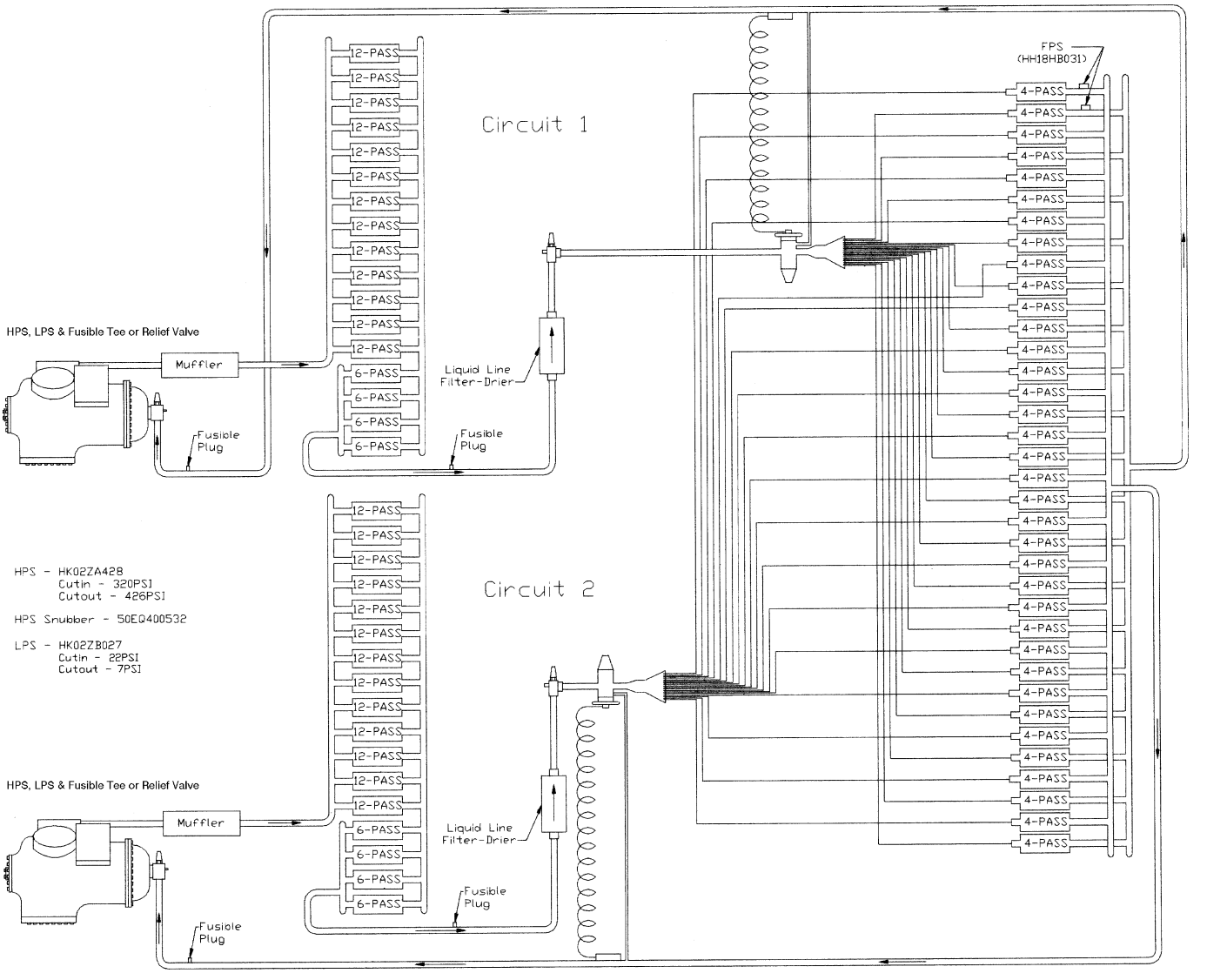
Typical refrigerant circuiting diagrams are shown in Fig. 68-73. An algorithm diagram of the IGC (Integrated Gas Unit Controller) control is shown in Fig. 74.



LEGEND

FPS — Freeze Protection Switch
HPS — High-Pressure Switch
LPS — Low-Pressure Switch

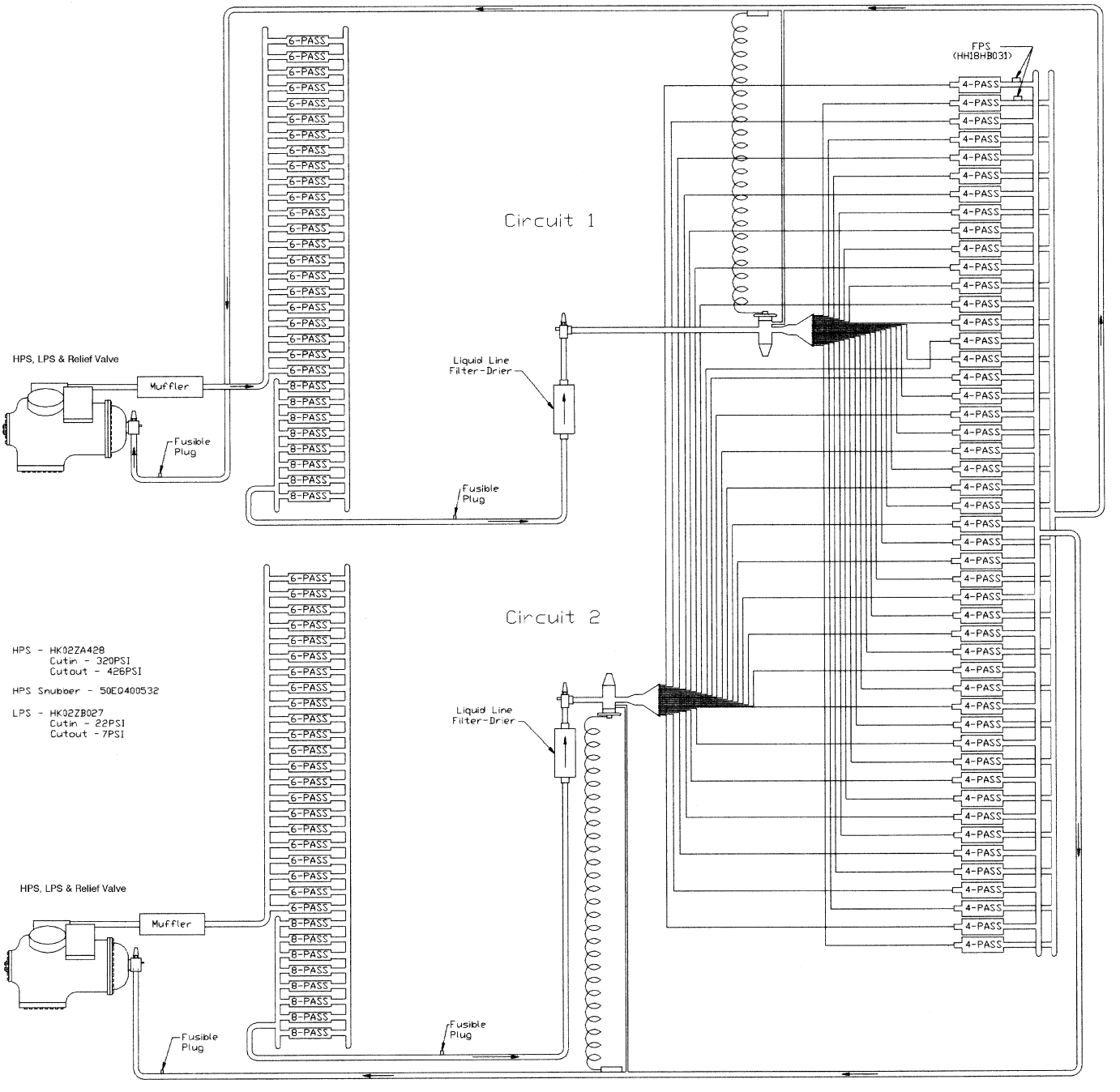
Fig. 68 — Typical Refrigerant Circuiting (48EJ,EK,EW,EY024-034)



LEGEND

FPS — Freeze Protection Switch
HPS — High-Pressure Switch
LPS — Low-Pressure Switch

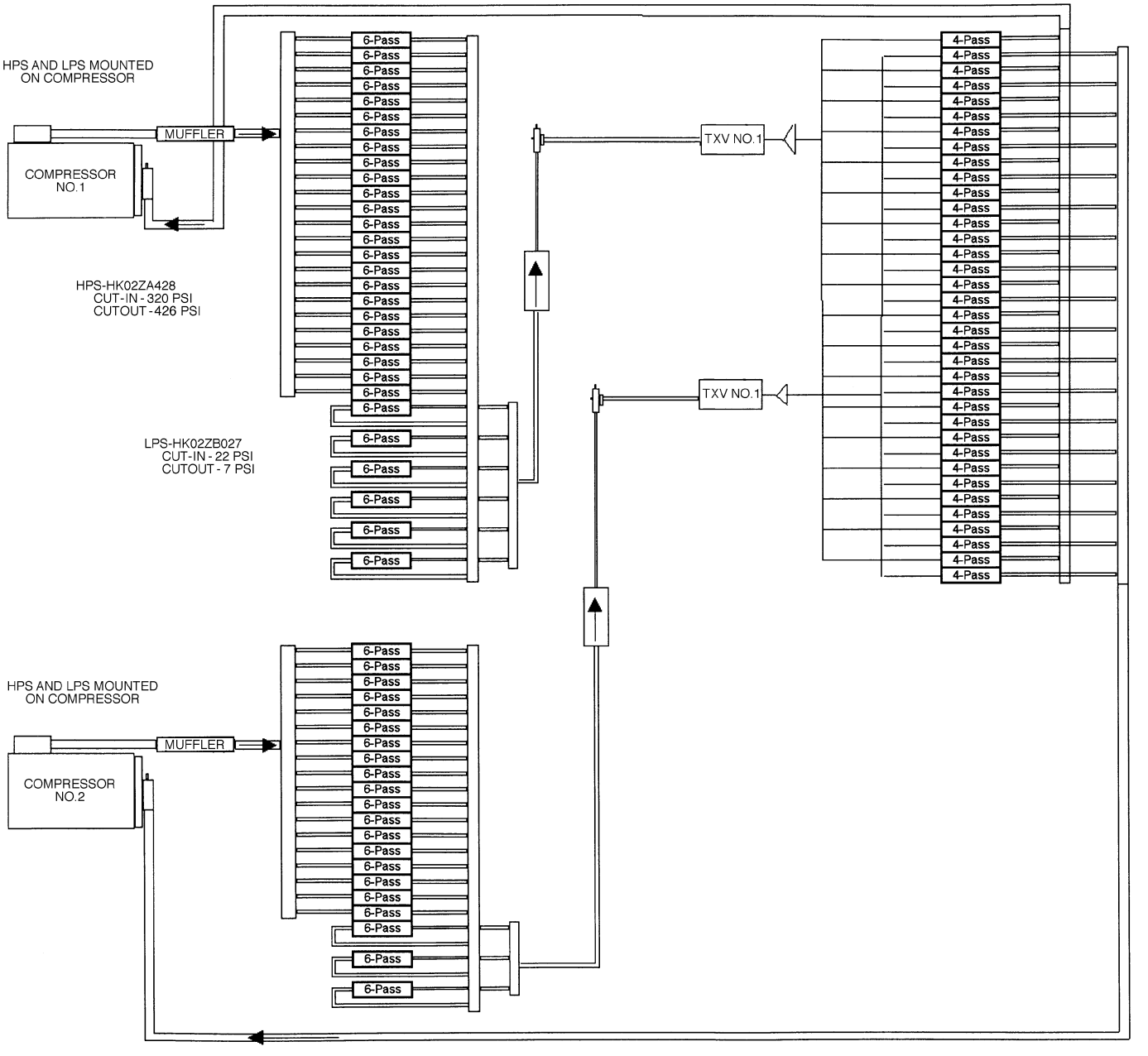
Fig. 69 — Typical Refrigerant Circuiting (48EJ,EK,EW,EY038,044)



LEGEND

FPS — Freeze Protection Switch
HPS — High-Pressure Switch
LPS — Low-Pressure Switch

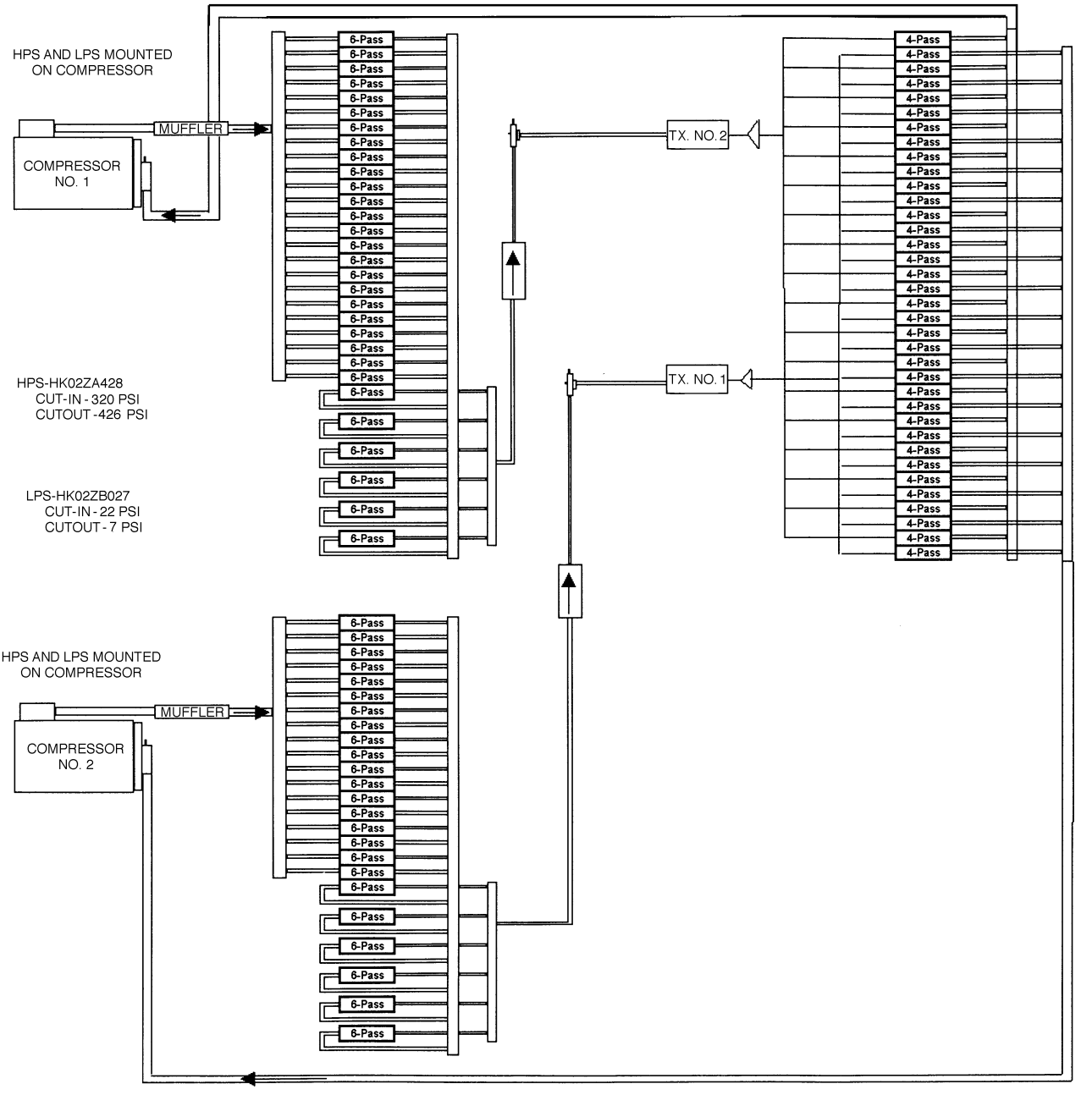
Fig. 70 — Typical Refrigerant Circuiting (48EJ,EK,EW,EY048)



LEGEND

HPS — High-Pressure Switch
LPS — Low-Pressure Switch
TXV — Thermostatic Expansion Valve

Fig. 71 — Typical Refrigerant Circuiting (48EJ,EK,EW,EY054 and 058)



LEGEND

HPS — High-Pressure Switch
LPS — Low-Pressure Switch
TXV — Thermostatic Expansion Valve

Fig. 72 — Typical Refrigerant Circuiting (48EJ,EK,EW,EY064)

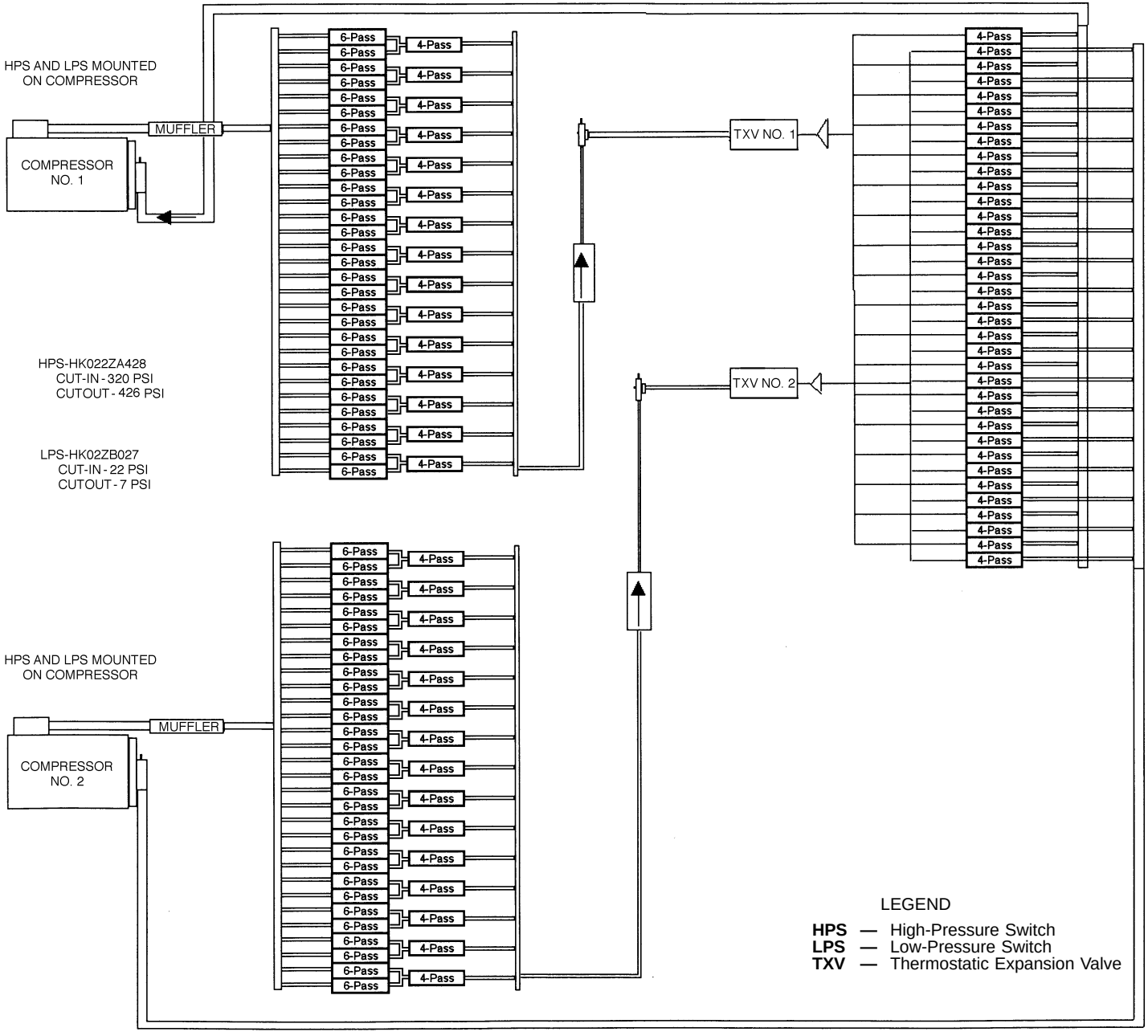
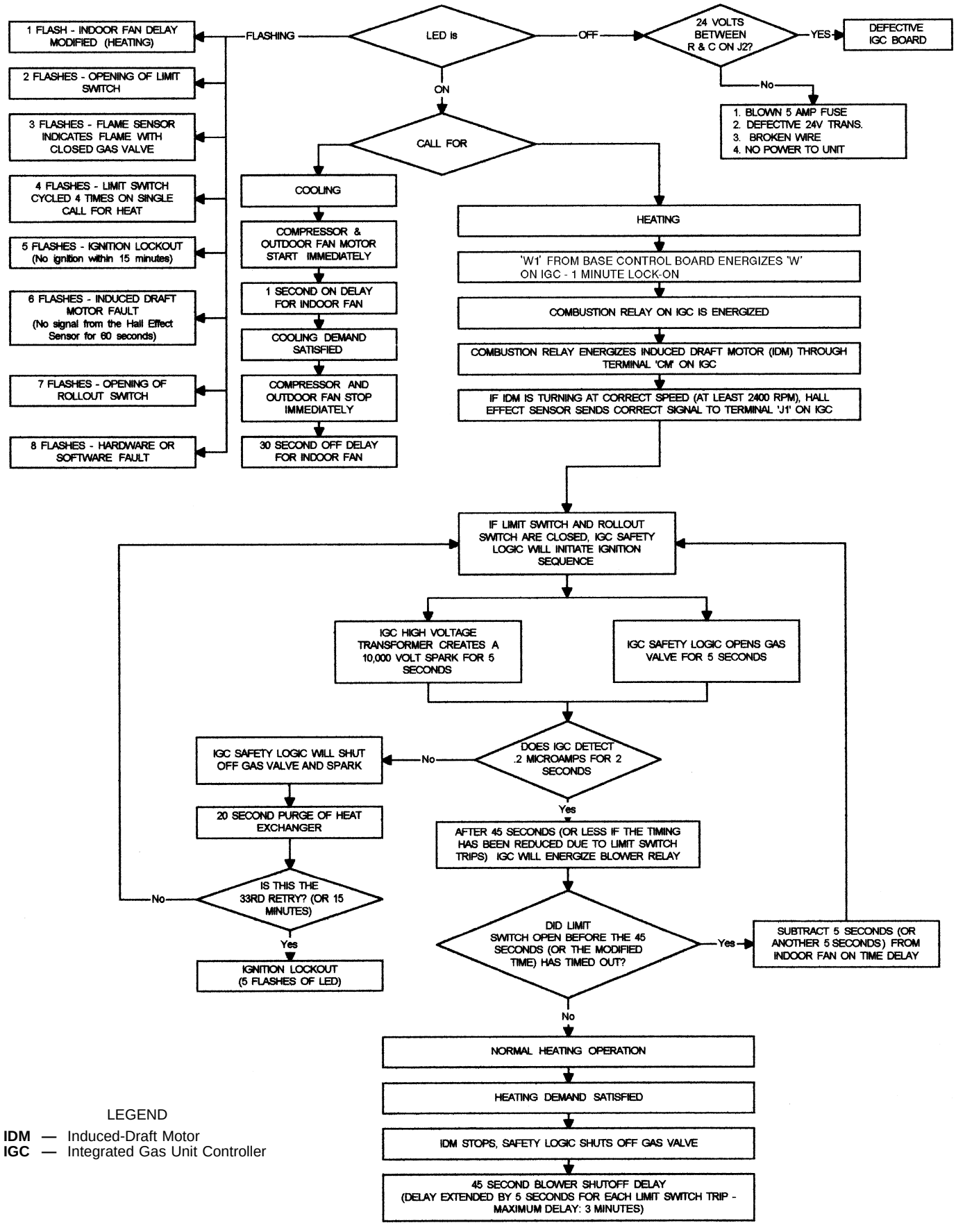


Fig. 73 — Typical Refrigerant Circuiting (48EJ,EK,EW,EY068)


LED is
FLASHING
1 FLASH - INDOOR FAN DELAY MODIFIED (HEATING)
2 FLASHES - OPENING OF LIMIT SWITCH
3 FLASHES - FLAME SENSOR INDICATES FLAME WITH CLOSED GAS VALVE
4 FLASHES - LIMIT SWITCH CYCLED 4 TIMES ON SINGLE CALL FOR HEAT
5 FLASHES - IGNITION LOCKOUT (No ignition within 15 minutes)
6 FLASHES - INDUCED DRAFT MOTOR FAULT (No signal from the Hall Effect Sensor for 60 seconds)
7 FLASHES - OPENING OF ROLLOUT SWITCH
8 FLASHES - HARDWARE OR SOFTWARE FAULT
OFF
24 VOLTS BETWEEN R & C ON J2?
YES
DEFECTIVE IGC BOARD
No
1. BLOWN 5 AMP FUSE
2. DEFECTIVE 24V TRANS.
3. BROKEN WIRE
4. NO POWER TO UNIT
ON
CALL FOR
COOLING
COMPRESSOR & OUTDOOR FAN MOTOR START IMMEDIATELY
1 SECOND ON DELAY FOR INDOOR FAN
COOLING DEMAND SATISFIED
COMPRESSOR AND OUTDOOR FAN STOP IMMEDIATELY
30 SECOND OFF DELAY FOR INDOOR FAN
HEATING
'W1' FROM BASE CONTROL BOARD ENERGIZES 'W' ON IGC - 1 MINUTE LOCK-ON
COMBUSTION RELAY ON IGC IS ENERGIZED
COMBUSTION RELAY ENERGIZES INDUCED DRAFT MOTOR (IDM) THROUGH TERMINAL 'CM' ON IGC
IF IDM IS TURNING AT CORRECT SPEED (AT LEAST 2400 RPM), HALL EFFECT SENSOR SENDS CORRECT SIGNAL TO TERMINAL 'J1' ON IGC
IF LIMIT SWITCH AND ROLLOUT SWITCH ARE CLOSED, IGC SAFETY LOGIC WILL INITIATE IGNITION SEQUENCE
IGC HIGH VOLTAGE TRANSFORMER CREATES A 10,000 VOLT SPARK FOR 5 SECONDS
IGC SAFETY LOGIC OPENS GAS VALVE FOR 5 SECONDS
DOES IGC DETECT .2 MICROAMPS FOR 2 SECONDS
No
IGC SAFETY LOGIC WILL SHUT OFF GAS VALVE AND SPARK
20 SECOND PURGE OF HEAT EXCHANGER
IS THIS THE 33RD RETRY? (OR 15 MINUTES)
No
Yes
IGNITION LOCKOUT (5 FLASHES OF LED)
Yes
AFTER 45 SECONDS (OR LESS IF THE TIMING HAS BEEN REDUCED DUE TO LIMIT SWITCH TRIPS) IGC WILL ENERGIZE BLOWER RELAY
DID LIMIT SWITCH OPEN BEFORE THE 45 SECONDS (OR THE MODIFIED TIME) HAS TIMED OUT?
Yes
SUBTRACT 5 SECONDS (OR ANOTHER 5 SECONDS) FROM INDOOR FAN ON TIME DELAY
No
NORMAL HEATING OPERATION
HEATING DEMAND SATISFIED
IDM STOPS, SAFETY LOGIC SHUTS OFF GAS VALVE
45 SECOND BLOWER SHUTOFF DELAY (DELAY EXTENDED BY 5 SECONDS FOR EACH LIMIT SWITCH TRIP - MAXIMUM DELAY: 3 MINUTES)
LEGEND
IDM — Induced-Draft Motor
IGC — Integrated Gas Unit Controller

NOTE: Thermostat Fan Switch in the "AUTO" position or sensor-equipped unit.

Fig. 74 — IGC Control (Heating and Cooling)

The alarm codes for the IGC control board are shown in Table 29.

Table 29 — IGC Control Board LED Alarms

INDICATION	ERROR MODE
ON	Normal Operation
OFF	Hardware Failure
1 FLASH	Fan ON/OFF Delay Modified
2 FLASHES	Limit Switch Fault
3 FLASHES	Flame Sense Fault
4 FLASHES	4 Consecutive Limit Switch Faults
5 FLASHES	Ignition Lockout Fault
6 FLASHES	Induced Draft Motor Fault
7 FLASHES	Rollout Switch Fault
8 FLASHES	Internal Control Fault

Diagnostic LEDs — There are 3 LEDs (red, yellow, and green) on the lower right hand side of the control board. The red light is used to check unit operation and alarms. A constant pulse is normal unit operation. A series of quick blinks indicates an alarm. Refer to Table 30 below for a description of alarms. The yellow LED blinks during transmission with the CCN (Carrier Comfort Network). The green LED blinks during transmission with the expansion board.

Table 30 — Control Board LED Alarms

LED Blinks	Error Code	Description	Troubleshooting Comments
1	—	Normal Operation	The expansion board and control board flash the red LED in one-second intervals when the board is operating properly.
2	HF-13	Compressor 1 Safety	The high or low pressure safety switch for compressor no. 1 has opened for 3 seconds. The error will be cleared and compressor no. 1 will be allowed to turn on in 15 minutes. If the safeties have been tripped 3 times in 90 minutes, compressor no. 1 will be locked out until the control board has been manually reset.
3	HF-14	Compressor 2 Safety	The high or low pressure safety switch for compressor no. 2 has opened for 3 seconds. The error will be cleared and compressor no. 2 will be allowed to turn on in 15 minutes. If the safeties have been tripped 3 times in 90 minutes, compressor no. 2 will be locked out until the control board has been manually reset.
4	HF-15	Thermostat Failure	The thermostat is calling for both heating and cooling at the same time. The unit will operate on a first call basis and will automatically reset.
5	HF-05	SAT Thermistor Failure	The supply-air temperature (SAT) sensor has failed. First check for wiring errors, then replace sensor.
6	HF-06	OAT Thermistor Failure	The outside air temperature (OAT) sensor has failed. First check for wiring errors, then replace sensor.
7	HF-03	Space Temp. Sen. Failure	The space temperature sensor has failed. First check for wiring errors, then replace sensor.
8	HF-12	RAT Thermistor Failure	The return-air temperature (RAT) sensor has failed. Ensure that the unit is a VAV unit. If NOT a VAV unit set DIP switch position 1 to the closed position and reset power. Then check for wiring errors. Finally, replace sensor.
9	SE-05	Loss of Communications with Expansion Board	Communications between the expansion board and the control board have been interrupted. Ensure that an expansion board is installed and wired using the wire harness supplied with the expansion module. If an expansion board is not used ensure that DIP switch position 3 is in the closed position, and reset power.
10	HF-16	Control Board Failure	Generated when hardware has failed on control board. Replace the control board.
11	HF-17	Expansion Board Failure	Generated when hardware has failed on the expansion board. Replace the expansion board.

LEGEND

DIP — Dual In-Line Package
VAV — Variable Air Volume

Tables 31-33 show the input and output channel designations.

Table 31 — I/O Channel Designations Base Module — CV

TERMINAL NO.	ASSIGNMENT	TERMINAL NO.	ASSIGNMENT
T1-2	SPT (CCN) — 10KΩ Thermistor	**T23-25**	Compressor 2 Safety — DI (24 vac)
T3-4	STO (CCN) — 10KΩ Thermistor	**T24-25**	Outside Air Enthalpy — DI (24 vac)
T5-6	OAT — 5KΩ Thermistor	**T26-27**	Economizer Pos. — AO (4-20 mA)
T7-8	SAT — 5KΩ Thermistor	**T28-29**	Heat 1 Relay — DO (24 vac)
T9-10	—	**T30-29**	Heat 2 Relay — DO (24 vac)
T11-12	SAT Reset — AI (4 to 20 mA)	**T31-32**	CV Power Exhaust 1/Modulating Power Exhaust — DO (115 vac)
T13-14	—	**T33-32**	CV Power Exhaust 2 — DO (115 vac)
T15-16	—	**T34-35**	Condenser Fan — DO (115 vac)
T17-25	Y1 or Remote Start/Stop — DI (24 vac)	**T36-35**	OFC2 — DO (115 vac)
T18-25	Y2 — DI (24 vac)	**T37-38**	—
T19-25	W1 — DI (24 vac)	**T39-38**	—
T20-25	W2 — DI (24 vac)	**K1**	Indoor Fan Relay — DO (LV)
T21-25	G — DI (24 vac)	**K2**	Compr. 1 — DO (HV)
T22-25	Compressor 1 Safety — DI (24 vac)	**K3**	Compr. 2 — DO (HV)

Table 32 — I/O Channel Designations Base Module — VAV

TERMINAL NO.	ASSIGNMENT	TERMINAL NO.	ASSIGNMENT
T1-2	SPT (CCN) — 10KΩ Thermistor	**T23-25**	Compressor 2 Safety — DI (24 vac)
T3-4	RAT — 5KΩ Thermistor	**T24-25**	Outside Air Enthalpy — DI (24 vac)
T5-6	OAT — 5KΩ Thermistor	**T26-27**	Economizer Pos. — AO (4-20 mA)
T7-8	SAT — 5KΩ Thermistor	**T28-29**	Heat 1 Relay − DO (24 v)
T9-10	—	**T30-29**	Heat Interlock Relay — DO (24 v)
T11-12	SAT Reset — AI (4 to 20 mA)	**T31-32**	Modulated Power Exhaust — DO (24 vac)
T13-14	—	**T33-32**	—
T15-16	—	**T34-35**	Condenser Fan — DO (115 vac)
T17-25	Remote Start/Stop — DI (24 vac)	**T36-35**	OFC2 — DO (115 vac)
T18-25	—	**T37-38**	Unloader 1 — DO (115 vac)
T19-25	—	**T39-38**	Unloader 2 — DO (115 vac)
T20-25	—	**K1**	Indoor Fan Relay — DO (LV)
T21-25	—	**K2**	Compr. 1 — DO (HV)
T22-25	Compressor 1 Safety — DI (24 vac)	**K3**	Compr. 2 — DO (HV)

Table 33 — I/O Channel Designations Expansion Module (Field-Installed) — CV AND VAV

TERMINAL NO.	ASSIGNMENT	TERMINAL NO.	ASSIGNMENT
T1-2	—	**T23 and TB2-1**	Fire — Evacuation — DI (24 vac)
T3-4	—	**T24 and TB2-1**	Fire — Smoke Purge — DI (24 vac)
T5-6	—	**T26-27**	—
T7-8	—	**T28-29**	—
T9-10	—	**T30 and TB2-2**	Alarm Light Indicator — DO (24 vac)
T11-12	IAQ Indoor — AI (4 to 20 mA)	**T31**	Power Exhaust Fire No. 1 — DO (115 vac)
T13-14	IAQ Outdoor — AI (4 to 20 mA)	**T33**	Power Exhaust Fire No. 2 — DO (115 vac)
T15-16	—	**T34**	Power Exhaust Fire No. 3 — DO (115 vac)
T17 and TB2-1	Fan Status — DI (24 vac)	**T36**	Power Exhaust Fire No. 4 — DO (115 vac)
T18 and TB2-1	Filter Status − DI (24 vac)	**T37**	Modulating Power Exhaust No. 5
T19 and TB2-1	Field Applied Status — DI (24 vac)	**T39**	Modulating Power Exhaust No. 6
T20 and TB2-1	Demand Limit — DI (24 vac)	**K1**	—
T21 and TB2-1	Fire — Unit Shutdown — DI (24 vac)	**K2**	—
T22 and TB2-1	Fire — Pressurization — DI (24 vac)	**K3**	—

LEGEND (Tables 31-33)

AI — Analog Input
AO — Analog Output
CCN — Carrier Comfort Network
CV — Constant Volume
DI — Direct Input
DO — Direct Output
HV — High Voltage
IAQ — Indoor Air Quality
KΩ — Kilo-Ohms
LV — Low Voltage
OAT — Outdoor-Air Temperature
OFC — Outdoor Fan Contactor
RAT — Return-Air Temperature
SAT — Supply-Air Temperature
SPT — Space Temperature
STO — Space Temperature Offset
T — Terminal
TB — Terminal Block
VAV — Variable Air Volume

NOTE: All even numbered terminals are negative (−) polarity and all odd numbered terminals are positive (+) polarity.

SERVICE TRAINING

Packaged Service Training programs are an excellent way to increase your knowledge of the equipment discussed in this manual, including:

- Unit Familiarization
- Installation Overview
- Maintenance
- Operating Sequence

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START-UP CHECKLIST

MODEL NO.: _____ SERIAL NO.: _____

SOFTWARE VERSION (SEE FIG. 20) _____ TECHNICIAN: _____

DATE: _____

PRE-START-UP:

☐ VERIFY THAT DIP SWITCH SETTINGS ARE CORRECT

☐ VERIFY THAT ALL PACKING MATERIALS HAVE BEEN REMOVED FROM UNIT

☐ REMOVE ALL COMPRESSOR SHIPPING HOLDDOWN BOLTS AND BRACKETS PER INSTRUCTIONS

☐ VERIFY INSTALLATION OF ECONOMIZER HOOD

☐ VERIFY INSTALLATION OF ALL OPTIONS AND ACCESSORIES

☐ VERIFY THAT CONDENSATE CONNECTION IS INSTALLED PER INSTRUCTIONS

☐ VERIFY THAT ALL ELECTRICAL CONNECTIONS AND TERMINALS ARE TIGHT

☐ CHECK GAS PIPING FOR LEAKS

☐ CHECK THAT INDOOR-AIR FILTERS ARE CLEAN AND IN PLACE

☐ VERIFY THAT UNIT IS LEVEL WITHIN TOLERANCES FOR PROPER CONDENSER DRAINAGE

☐ CHECK FAN WHEELS AND PROPELLERS FOR LOCATION IN HOUSING/ORIFICE, AND VERIFY SETSCREW IS TIGHT

☐ VERIFY THAT FAN SHEAVES ARE ALIGNED AND BELTS ARE PROPERLY TENSIONED

☐ VERIFY THAT SUCTION, DISCHARGE, AND LIQUID SERVICE VALVES ON EACH CIRCUIT ARE OPEN

START-UP

ELECTRICAL

SUPPLY VOLTAGE L1-L2 _____ L2-L3 _____ L3-L1 _____

COMPRESSOR AMPS — COMPRESSOR NO. 1 L1 _____ L2 _____ L3 _____

— COMPRESSOR NO. 2 L1 _____ L2 _____ L3 _____

SUPPLY FAN AMPS (CV) _____ EXHAUST FAN AMPS _____

(VAV) _____*

*VAV fan supply amps reading must be taken with a true RMS meter for accurate readings.

☐ ADJUST VARIABLE FREQUENCY DRIVE (VFD) TO APPLICATION REQUIREMENTS.

TEMPERATURES

OUTDOOR-AIR TEMPERATURE _____ F DB (Dry Bulb)

RETURN-AIR TEMPERATURE _____ F DB _____ F WB (Wet Bulb)

COOLING SUPPLY AIR _____ F

GAS HEAT SUPPLY AIR _____ F

PRESSURES

GAS INLET PRESSURE _____ IN. WG

GAS MANIFOLD PRESSURE STAGE NO. 1 _____ IN. WG STAGE NO. 2 _____ IN. WG

REFRIGERANT SUCTION CIRCUIT NO. 1 _____ PSIG CIRCUIT NO. 2 _____ PSIG

REFRIGERANT DISCHARGE CIRCUIT NO. 1 _____ PSIG CIRCUIT NO. 2 _____ PSIG

☐ VERIFY REFRIGERANT CHARGE USING CHARGING CHARTS ON PAGES 64 AND 65

GENERAL

☐ SET ECONOMIZER MINIMUM VENT POSITION TO JOB REQUIREMENTS

☐ ENSURE DRIVES OPERATE WITHIN LIMITS OF FAN PERFORMANCE TABLES

HIGH PRESSURE SWITCH SETTING _____ psig

LOW PRESSURE SWITCH SETTING _____ psig

MOTOR PULLEY PART NUMBER _____

FAN PULLEY PART NUMBER _____

BELT PART NUMBER _____

BELT SIZE _____ in.

FILTER QUANTITY _____

FILTER SIZES _____ in.

ADDITIONAL NOTES:

_____

_____

_____

_____

_____

_____

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